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NOTES ON THE FLORA OF 'IRAQ WITH KEYS—PART III.*

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CARYOPHYLLACEAE (including ILLECEBRACEAE).

ARTIFICIAL KEY TO THE GENERA

A. Stipules absent

B. Sepals united

C. Calyx linear-cylindric, 10–14 mm. long, 1 mm. wide ; no bracteoles at base of calyx ; annual *Velezia rigida* L.

C.¹ Calyx wider or, if c. 1 mm. wide then calyx shorter and plant perennial with leaves ending in a spine

D. Leaves stiff linear ending in a spine (spine 1–1.5 mm. long) ; calyx 5–15-nerved, up to 8 mm. long ; capsule opening by a circumcissile lid ; perennial *Acanthophyllum* C.A.M.

D.¹ Leaves not ending in a spine, or, if ending in a spine then not linear ; capsule opening by teeth

E. One or more pairs of bracteoles (calyx scales) at base of calyx
Dianthus L.

E.¹ No bracteoles at base of calyx, some flowers at least with pedicels above the bracts

F. Calyx up to 6.5 mm. long with scarious lines between teeth to base of calyx *Gypsophila* L.

F.¹ Calyx not as above, generally longer

G. Calyx with 5 sharp wings, without nerves below sinus between teeth ; styles 2 ; glabrous plant . . . *Saponaria vaccaria* L.

G.¹ Calyx without 5 sharp wings ; plant hairy or glabrous

H. Calyx without a nerve below sinus between teeth, calyx 7–10 mm. long ; stem and leaves \pm glandular-pubescent ; leaves linear-tapering ; styles 2 *Tunica* Scop.

* Continued from Kew Bull. (1955) 497–565 (1956).

H¹ Calyx with nerves below sinus between teeth ; stem and leaves glabrous or hairy sometimes glandular ; styles 2-3-5

I. Capsule 1-celled to base

J. Styles 3-5 *Melandrium* Roehl.

J¹ Styles usually 2 *Saponaria* L.

I¹ Capsule 1-celled above, 3-5 celled at base ; styles usually 3
Silene L.

B¹ Sepals free

K. Inflorescence linear ; leaves linear-subulate connate at base ; outer sepals slightly smaller and differing in nervation and colour from inner ones ; 2 styles ; 2 capsule teeth . . . *Buffonia* L.

K¹ Not as above ; inflorescence wider

L. Petals irregularly toothed ; erect annual generally with a basal rosette of oblanceolate leaves ; flowers in umbel-like terminal cymes ; capsule ovoid-cylindric with 6 teeth . . *Holosteum* L.

L¹ Not as above ; petals bifid, emarginate, entire or none (sometimes irregularly dentate in *Lepyrodiclis* ?)

M. Petals bifid

N. Capsule ovoid or globose, 2-6 teeth

Stellaria L. and *Lepyrodiclis* Fenzl ex Endl.

N¹ Capsule cylindrical, with twice as many teeth as styles

Cerastium L.

M¹ Petals emarginate, entire or absent

O. Leaves lanceolate or linear-lanceolate, sessile, 3-9 cm. long 0.2-1.8 cm. wide ; capsule globose . *Lepyrodiclis* Fenzl ex Endl.

O¹ Not as above ; leaves smaller

P. Sepals obtuse or rounded at apex, not nerved or with one obscure nerve ; styles fewer than or as many as sepals

Q. Leaves linear, less than 1 mm. wide at middle

R. Petals white as long as or shorter than sepals, 4-5, entire ; sepals 4-5, up to 2 mm. long ; styles 4-5 ; capsules 4-5 valves *Sagina* L.

R¹ Petals pink, longer than sepals, 4-5, emarginate ; sepals 4-5, 1.5-2.5 mm. long ; styles 3 ; capsule with 3 teeth

Minuartia picta (S. et S.) Bornm.

Q¹ Leaves wider *Stellaria* L.

P¹ Sepals acute, acuminate or ending in an awn, nerved ; styles fewer than sepals

S. Sepals acute to acuminate, not awned ; petals entire or slightly emarginate ; fruit a capsule ; annual or perennial

T. Capsule with as many teeth as styles . . *Minuartia* L.

T¹ Capsule with twice as many teeth as styles . *Arenaria* L.

S¹ Sepals ending in an awn half as long as or nearly as long as sepal ; petals entire or slightly emarginate ; styles 2 ; ovary with 2 ovules ; fruit indehiscent . . . *Habrosia* Fenzl

A¹ Stipules present

U. Inflorescence dense, flowers \pm hidden by bracts or stipules

V. Stipules not conspicuous white nor papery

X. Leaves ending in a short stiff spine ; peduncle not flattened nor widened ; flowers capitate

Y. Plant not glandular ; spiny bracts straight radiating in all directions ; fruit an achene . *Sclerocephalus arabicus* Boiss.

Y¹ Plant glandular-viscid ; spiny bracts pointing \pm upwards and slightly curved outwards ; fruit an achene

Loeflingia hispanica L.

X¹ Leaves not ending in a spine

Z. Inflorescence terminal ; peduncle much flattened and widened ; bracts spiny and hooked at apex . *Pteranthus dichotomus* Forsk.

Z¹ Inflorescence lateral ; peduncle not flattened nor widened ; no spiny hooked bracts *Herniaria* L.

V¹ Stipules conspicuous white and papery, especially towards end of branches

1. Largest stipules over 3 mm. long ; stem and leaves glabrous, scabrid or pubescent *Paronychia* Juss.

1¹ Stipules up to 3 mm. long ; stem and leaves tomentose

Polycarpaea Lam.

U¹ Inflorescence loose so that individual flowers can be seen

2. Leaves up to 1 rarely 2 cm. long, linear to obovate

3. Leaves ending in a spine ; sepals not keeled ending in a short spine ; fruit a capsule ; stem and leaves tomentose

Polycarpaea Lam.

3¹ Leaves not ending in a spine

4. Inflorescence terminal ; fruit a capsule

5. Lower leaves obovate to oblong-spathulate in apparent whorls of 4 or more

6. Sepals not glaucous, keeled, mucronate acute or obtuse ; petals not cordate at base ; leaves obovate to oblong-spathulate

Polycarpon L.

6¹ Sepals glaucous, not keeled, obtuse ; petals cordate at base ; leaves oblong-spathulate *Robbairia* Boiss.

5. Leaves alternate *Telephium* L.

- 4¹ Inflorescence lateral ; fruit an achene . . . *Herniaria* L.
- 2¹ Larger leaves more than 1–2 cm. long, leaves all narrowly linear, up to 2 mm. wide ; styles 3 or 5
7. Leaves several in an apparent whorl *Spergula* L.
- 7¹ Leaves in pairs, sometimes with fascicles of small leaves in their axils *Spergularia* Presl

There is an account of this family by Pax and Hoffmann in *Pflanzenfam.* **16c**, (1934). Burtt and Lewis in *Kew Bull.* 333–350 (1952) and Turrill "Flora of Tropical East Africa" 1956 include the *Illecebraceae* in the *Caryophyllaceae*.

ENUMERATION AND KEYS TO SPECIES

In this enumeration, species are only listed when they were not given in "The Rustam Herbarium, 'Iraq'" in *Kew Bull.* 396–403 (1948) and 444 (1950) or where some additional note is needed. On the other hand, all the species so far known from 'Iraq' are dealt with in the keys.

Acanthophyllum C.A.M.

- A. Densely tufted, up to 6 cm. tall, internodes inconspicuous (up to 5 mm. long) ; calyx 8 mm. long ; leaves pubescent, persistent towards base of plant *A. caespitosum* Boiss.
- A¹ Less densely tufted, 10–35 cm. tall, internodes conspicuous up to 1 cm. or more long ; calyx 3–4 mm. long
- B. Leaves pubescent, persistent towards base of plant
A. crassifolium Boiss.
- B¹ Leaves glabrescent, or scabrid-papillose, more fleshy, not persistent towards base of plant . . . *A. verticillatum* (Willd.) Hand.-Mazz.

Acanthophyllum caespitosum Boiss.

Biyara, Jabal Avroman, Sulaimaniya liwa, 950 m., steep open slopes, metamorphic rock, locally abundant, flowers pink and white, forming cushions, only seen in one spot, 6.6.1948, Gillett 11742 ; in schistos. M. Avroman, June 1867, Haussknecht.

Distr. N. Pers., N. 'Iraq.

Acanthophyllum crassifolium Boiss. (*A. kurdicum* Boiss. et Haussk. ; *Gypsophila antilibanotica* Post).

Riwandous [Rowanduz] ad fines Pers. in m. Sakri-Sakran, 1500 m., 23.6.1893, Bornmüller 952 ; Mergadreja near Haji Omran, Arbil liwa, 1700 m., mountainside, pink, 21.6.1947, Rawi 9155 ; Kodo near Haji Omran, 2200 m., mountainside, pink, 22.6.1947, Rawi 9230 ; eastern slopes of Arl Gird Dag, Arbil liwa, 2100 m., *Astragalus*-thorn-cushion zone on igneous or metamorphic rock, pale pink, 4.8.1947, Gillett 9494 ;

Helgord [Arl Gird Dag], 1900 m., on the mountain, flowers pink, 1.7.1954, *Rawi* 13829.

Bornmüller 952 shows the narrow leaves of *A. kurdicum* but the retuse petals of *A. crassifolium*. *Bornmüller* 23 from Persia : Sultanabad has entire and retuse petals on the same plant, which has the thick leaves of *A. crassifolium*. It, therefore, seems better to regard the two as one species.

***Acanthophyllum verticillatum* (Willd.) Hand.-Mazz.** (*Arenaria verticillata* Willd. ; *Acanthophyllum tournefortii* Fenzl).

Handel-Mazzetti p. 152 (1912) records this species from "Ameril gegen Mossul. 400–1300 m."

Distr. Asia Minor, N. 'Iraq.

***Arenaria* L. and *Minuartia* L.**

A. Perennial

B. Leaves linear ; plant caespitose

[C. Basal leaves up to 6 cm. or more long ; sepals glandular pubescent, inner ones obtuse, outer ones acute ; petals 14–20 mm. long
A. cucubaloides Sm.]

C¹ Basal leaves up to 2 cm. long ; sepals all acute

D. Leaves up to 1 cm. long, 0.5 (rarely 1) mm. wide, \pm subulate, curved, generally obtuse ; petals shorter than 5-nerved sepals
M. recurva (All.) Schinz & Thell.

D¹ Leaves up to 2 cm. long, generally flat, \pm straight, acute ; petals longer than 3-nerved sepals . *M. aucheriana* (Boiss.) Bornm.

B¹ Leaves ovate, apices obtuse ; stems prostrate . *A. balansae* Boiss.

A¹ Annual

E. Some of the leaves ovate

F. Upper leaves ovate or lanceolate, acuminate ; petals shorter than sepals ; pedicels erect to spreading in fruit
A. leptoclados (Reichb.) Guss.

F¹ Upper leaves linear-spathulate, lowermost leaves ovate ; petals as long as sepals ; pedicels deflexed in fruit
Arenaria sp. (Gillett 8076)

E¹ Leaves \pm linear

G. Inflorescence dense, flowers touching each other ; petals shorter than sepals

H. Flowers subsessile

I. Sepals not hooked at apex

J. Calyx 5–6 mm. long, rotundate at base . *M. montana* Loebl.

J¹ Calyx 3–5 mm. long, truncate at base

M. intermedia (Boiss.) Hd.-Mazz.

I.¹ Sepals ending in a recurved hook

M. hamata (Hausskn.) Mattf.

H.¹ Flowers pedicellate ; calyx 4-6 long, rotundate at base

M. meyeri (Boiss.) Bornm.

G.¹ Inflorescence loose, flowers not touching each other ; petals various

K. Sepals acute at apex ; petals various

L. Leaves subulate or linear-subulate

M. Sepals up to 4 mm. long ; petals white shorter than sepals

M. tenuifolia (L.) Hiern

M.¹ Sepals up to 3 mm. long ; petals longer than sepals

A. sabulinea Griseb.

L.¹ Upper leaves linear-spathulate, lowermost leaves ovate ; sepals 2 mm. long ; petals as long as sepals

Arenaria sp. (Gillett 8076)

K.¹ Sepals obtuse ; petals pink longer than sepals

M. picta (S. et S.) Bornm.

There is a monograph of the genus *Minuartia* in Fedde Rep. Sp. Nov. Beih. **15**, 1-228 (1922) by J. Mattfield, and "A Revision of the genus *Arenaria*, Linn." by F. N. Williams in Journ. Linn. Soc. **33**, 326-437 (1898).

***Arenaria balansae* Boiss.**

Arl Gird Dag, Arbil liwa, 2800-3200 m., subalpine igneous or metamorphic rocks, common, white, 5.8.1947, *Gillett* 9602 ; Ser Kurawa, Arbil liwa, 2000-3200 m., gravel near snow, igneous or metamorphic, abundant, petals white or entire, 11.8.1947, *Gillett* 9726.

Distr. Asia Minor, Pers.

[*Arenaria cucubaloides* Sm.

Mountains of Kurdistan, *A. H. Layard*.

Possibly this was not collected in 'Iraq.

Distr. Asia Minor, Pers.].

***Arenaria leptoclados* (Reichb.) Guss.**

Exptd. to the Euphrates, *Chesney* 198 ; Badra, Kut liwa, 100 m., dry steppe, *Stipa capensis* dominating on stony hills, frequent, corolla white minute, 18.3.1947, *Gillett* 6604 ; Eski Kellek, Mosul liwa, 230 m., moist steppe, dry stony slopes, locally frequent, corolla white, 23.3.1948, *Gillett and Rawi* 10378 ; Zab near Kau Gossik, Arbil liwa, 250 m., sand-bank, moist steppe climate, occasional, white petals not notched, 28.3.1948, *Gillett* 10535 ; Jarmo, Kirkuk liwa, rock shade, white, 24.3.1955, *Helbaek* 449.

Zohary p. 51. (1950) records this from the Jabal Sinjar, Rowanduz, Sulaimaniya, Kirkuk, Dohuk and Jazira areas.

The specimens seen and cited above are glandular-pubescent on the vegetative parts and sepals. The capsules are about as long as the calyx.

***Arenaria sabulinea* Griseb. var. *brevipes* Bornm.** in Beih. Bot. Centralb. 28, II, 149 (1911).

Bornmüller records this from "Ostlich von Erbil am Wege nach Schaklawā am Kuh-i-Sefin, 700 m. (6.V. 1893 ; no. 941). In der Ebene bei Kerkuk Kalkhügel, 400 m. (28.IV.1893 ; no. 941 b)".

This variety is described as "pedicellis calyce subduplo tantum (nec "multoties") longioribus".

***Arenaria* sp.**

Sefin Dagħ above Shaqlawā, Arbīl liwā, 1200 m., oak forest formation, limestone crags, N. aspect, occasional, white, 9.5.1937, Gillett 8076.

This gathering is intermediate between *A. leptoclados* and *A. sabulinea* in leaf-shape and length of the petals. The fruiting pedicels are sharply deflexed as in *A. sabulinea*.

Arenaria gypsophiloides L. and *A. lychnidea* M.B. were collected by Brant in "Kurdistan"; the labels are "Kurdistan, J. Brant, W. H. F. Strangways, 1840" on the sheets at Kew; the date 1840 may refer to the date on which they were received by Lindley, to whom some of Brant's specimens were sent by Strangways, rather than to the date of collection (see Bot. Reg. 26, app. 3 : 1840). Brant's journey in 1838 was in Turkey not 'Iraq (in Journ. R. Geog. Soc. 10, 341-432 and map opposite p. 530 : 1841).

***Buffonia* L.**

A. Annual ; pedicels glabrous to tomentose ; sepals narrow-lanceolate 3-4 mm. long ; ovary 2-ovulate *B. oliveriana* Ser.

A.¹ Perennial

B. Pedicels glabrous to pubescent ; sepals wide lanceolate 3-6 mm. long, 1.5-2 mm. wide ; ovary 4-ovulate

B. calycina Boiss. et Haussk.

B.¹ Pedicels tomentose ; sepals narrow lanceolate, 3-3.5 mm. long, 1 mm. wide ; ovary 2-ovulate *B. multiceps* Decne.

***Buffonia calycina* Boiss. et Haussk.**

Eastern slopes of Arl Gird Dagħ, Arbīl liwā, 2600 m., *Astragalus*-thorn cushion-zone on igneous or metamorphic rock, locally common, petals white, sepals brownish, 5.8.1947, Gillett 9612.

Very close to the Persian *B. kotschyana* Boiss., but the material of both species is rather inadequate to compare them critically. Gillett 9612 is, however, a good match for Haussknecht's specimen of *B. calycina* from Avroman and Schahu.

***Buffonia multiceps* Decne.**

Sarsing [Sersang], Mosul liwā, 4500 ft., stony slopes beside gorge, 13.7.1955, Haines W 490.

This species was originally described from Sinai, but has since been collected in Syria (see Gombault in Bull. Soc. Bot. France 89, 137 :

1942), and more recently in Asia Minor : Vilayet Antalya, Kesme boğaz near Kemer, 15.7.1947, *Davis* 14073 ; Vilayet Antalya (Pamphylia), Cakirlir, 30 m., on metamorphic outcrop, 10.7.1949, *Davis* 16442 ; Prov. Hakkari, Cilo Dag, in Diz deresi, 5800 ft., rocky slope, perennial, 6.8.1954, *Davis and O. Polunin* 24003, 23878.

There is considerable variation in the density of the indumentum on the stems. *Haines* W 490 and the material from Asia Minor cited above show stems with only a very fine sparse pubescence on the basal internodes while the upper part of the stem is glabrous or glabrescent. In material from Sinai (*Bové* 209 (isotype) ; *Schimper* 328) the stem may be velutinous to the apex. The dense white indumentum on the pedicels seems to be a constant character of the species. The pedicels are sometimes deflexed.

There is considerable variation in the length of the petals. In the material from Sinai the petals are shorter than the sepals. In the specimens from Asia Minor and 'Iraq the sepals are about 3 mm. long, but the petals vary—*Haines* W 490 petals 4 mm. long ; *Davis* 16442 petals 1-1.5 mm. long ; *Davis and O. Polunin* 24003 petals 1.5 mm. long. *Davis and O. Polunin* 23878, although from the same locality and altitude as 24003, has petals a little longer than the sepals.

The outer sepals in *Davis and O. Polunin* 24003 are ciliolate, but the vaginas at the base of the leaves are 1-1.5 mm. long in *B. multiceps*, not 3-4 mm. long as in *B. ephredrina* G. Samuelsson.

Distr. Sinai, Syria, 'Iraq, Asia Minor.

Cerastium L.

A. Annual ; petals at most a little longer than calyx

B. Glabrous ; leaves lanceolate to ovate, connate at base

C. perfoliatum L.

B¹ Hairy ; leaves shape various, not connate at base

C. Leaves linear, linear-spathulate to oblong ; capsule teeth not revolute or slightly revolute at their margins

D. Plant sparsely glandular-pubescent glabrescent towards base ; leaves up to 4 mm. wide ; sepals obtuse to acute, 3-8 mm. long in fruit *C. anomalum* W.K.

D¹ Plant glandular-pubescent ; leaves up to 1 cm. ; sepals very acute 7-17 mm. long in fruit

E. Inflorescence dense ; fruiting calyx oblong slightly accrescent 7-11 mm. long *C. dichotomum* L.

E¹ Inflorescence loose ; fruiting calyx ovate-globose more accrescent 9-17 mm. long *C. inflatum* Link

C¹ Leaves generally wider often ovate ; capsule teeth revolute at their margins

F. Inflorescence a dense cymose cluster, flowers touching each other, pedicels generally shorter than calyx ; sepals acute ; fruit deflexed or not

G. Uppermost bracts herbaceous ; sepals with a narrow scarious margin ; fruit not deflexed *C. glomeratum* Thuill.

G.¹ Uppermost bracts with a scarious apex, sepals with a scarious apex and wide scarious margin ; fruit deflexed

C. semidecandrum L.s.l.

F.¹ Inflorescence a loose cyme, flowers not all touching each other, pedicels usually longer than sepals ; sepals acute or obtuse ; fruit deflexed

H. Very glandular short hairs ; sepals obtuse

C. fragillimum Boiss.

H.¹ Not so glandular, hairs long ; sepals acute

C. brachypetalum Desf.

A.¹ Perennial ; petals twice as long as calyx

I. Styles usually 3 ; calyx 2–6 mm. long ; leaves up to 2 cm. long but generally under 1 cm. long, up to 3 mm. wide ; plant up to 15 cm. but generally less *C. cerastoides* (L.) Britton

I.¹ Styles 4–5 ; calyx 7–12 mm. long ; plant somewhat larger in all parts

J. Plant up to 10 cm. high ; leaves up to 11 mm. long, 4 mm. wide ; sepals 5–7 mm. long ; fruiting pedicels up to 1.5 cm. long

C. elbrusense Boiss.

[J.¹ Plant 6–30 cm. high ; leaves 5–30 (rarely 60) mm. long, 3–9 mm. wide ; sepals 7–11 mm. long ; fruiting pedicels 1–3.3 cm. long

C. purpurascens Adam]

***Cerastium brachypetalum* Desf.**

Shaqlawā, 4000 ft., frequent in shady rocks, 12.5.56, *Haines* W603. Bornmüller (p. 150) records thus from "Felsige Abhänge des Kuh-i-Sefin (Kurdistan), ca. 1000 m. (9.V.1893 ; no. 945)" with the note "Reichdrüsig, wohl var. *Tauricum* Spreng. (als Art)." The uppermost bracts in this species are herbaceous.

***Cerastium cerastoides* (L.) Britton var. *parviflorum* (Ledeb.) Bornm.** in Beih. Bot. Centralbl. **28**, II, 150 (1911).

Bornmüller's description reads "glabrum, calycibus valde abbreviatis minoribusque, capsula 5–8 mm. tantum longa". The type is cited as "Alpenregion des Kuh-i-Dschupar, 2900 m. (10.VI.1892 ; no. 2304)".

***Cerastium dichotomum* L.**

Penjwin, Sulaimaniya liwa, 1200 m., vernacular name glunca spica, 24.4.1947, *Rawi* 8549u.

This species is very closely related to *C. inflatum* L.

***Cerastium elbrusense* Boiss.**

Arl Gird Dagħ, 3300 m., 22.7.32, *Guest* 3074.

This specimen I previously identified as *C. cerastoides*, but on re-examining it, it seems better placed in *C. elbrusense* as it is a good match for

type material at Kew. The species is not readily distinguished from stunted plants of *C. purpurascens*, but the geographical range is different.

Distr. N. Pers.

***Cerastium fragillimum* Boiss.**

Shaqlawa, 4000 ft., abundant in shady rocks, 14.5.56, *Haines* W602.

Bornmüller (p. 151) records this as "Felsige Abhänge des Kuh-i-Sefin, oberhalb des Dorfes Schaklawä, 1200 m. (11.V.1893 ; no. 946)", with the note "Die Kapseln meiner Exemplare erreichen eine Länge von 8–11 mm. ; sie sind daher meist mehr als doppelt so lang als der 4–5 mm. lange Kelch". The uppermost bracts in this species are herbaceous.

***Cerastium glomeratum* Thuill. (*C. viscosum* auct.)**

Sulaimaniya, growing in a bog, Apr. 1923, *Graham* 722 ; Zab below Kau Gossik, Arbil liwa, 250 m., sandbank, moist steppe climate, common, petals evenly divided for one third of their length, 28.3.1948, *Gillett* 10524 ; Jarmo, Kirkuk liwa, damp station under rock shelf, white, 27.3.1955, *Helbaek* 481 ; Palegawra, 1000 m., spur on ridge in the Kurdish foothills west of Sagirrma Dagħ, 15 miles S.W. of Pir-i' Mukhrun [Pir Omar Gudrun] of the Zagros mountains, steep calcareous sandstone, rainfall obviously better than at Jarmo, along creek 50 m. beneath mountain top, 6.4.1955, *Helbaek* 685.

The specimens cited in "The Rustam Herbarium" p. 396 under *C. viscosum* L. should be placed in *C. glomeratum*.

[*Cerastium purpurascens* Adam

Kurdistan, *Olguin* ; Kurdistan, 1840, *Brant & Strangways*. These two specimens are probably not from 'Iraq.

Distr. Cauc., As. Min.]

***Cerastium semidecandrum* L. s.l.**

Great Zab, 5 km. south of Kau Gossik, Arbil liwa, 250 m., sandbank by river, moist steppe climate, white, petals asymmetrically notched, 28.3.1948, *Gillett* 10525.

This species in the broad sense has been monographed by Möschl (in Mem. Soc. Brot. **5**, 5–120 : 1949). *Gillett* 10525 belongs to *C. balearicum* Hermann according to Möschl's key (p. 120), where *C. semidecandrum* s.l. is divided into three species.

Distr. (*C. semidecandrum* L. s.l.), Eur., Cypr., Cauc., As. Min., Syr., N. Pers., Transcasp., Turkestan.

***Dianthus* L. (by S. S. Hooper).**

A. Calyx uniformly punctate-verruculose, generally with nerveless areas

B. Annual ; petal lamina glabrous *D. cyri* Fisch. et Mey.

B¹ Perennial ; petal lamina barbulate (i.e. with patch of long hairs at base on inside)

- C. Parts of calyx nerveless
- D. Calyx 13–17 mm. long ; lowermost internodes generally glabrous
D. strictus Banks et Sol. var. *gracilior* (Boiss.) Eig
- D¹ Calyx 10–12 mm. long ; lowermost internodes hairy
D. strictus var. *micranthus* (Boiss.) Eig
- C¹ Calyx uniformly nerved
D. strictus var. *gracilior* f. *nervosus* Blakelock
- A¹ Calyx not punctate-verruculose, striate-nervose throughout
- E. Flowers clustered (6–8 together) at apex of each stem
 *Haines W517
- E¹ Flowers solitary or paired at apex of each branch
- F. Calyx scales (bracteoles) 10–14 in number
- G. Petal lamina 8–12 mm. long, margin deeply dentate
D. pendulus Boiss. et Bl.
- G¹ Petal lamina 3–5 mm. long, margin entire, sinuate or shortly bifid
D. siphonocalyx Blakelock
- F¹ Calyx scales 4–8 in number
- H. Outer calyx scales obtuse and mucronate to cuspidate
- I. Calyx 20–27 mm. long ; petal lamina dentate to fimbriate
- J. Petal lamina c. 6 mm. long ; cauline leaves c. 10 mm. long
D. orientalis Adam var. *brachyodontus* (Boiss. et Huet.) Bornm.
- J¹ Petal lamina c. 10 mm. long ; cauline leaves c. 30 mm. long
D. orientalis Adam var. *macropetalus* (Boiss.) Bornm.
- I¹ Calyx c. 14 mm. long ; petal lamina crenulate . . *Gillett 9699
- H¹ Outer calyx scales acute to acuminate
- K. Calyx 25–45 mm. long ; cauline leaves spreading
- L. Plant glaucous ; flowers borne singly ; calyx 25–35 mm. long ;
 petal lamina not barbulate
- M. Calyx shortly and densely hairy ; petal lamina laciniate
D. basianicus Boiss. et Hausskn.
- M¹ Calyx smooth ; petal lamina entire to shallowly dentate
D. judaicus Boiss.
- L¹ Plant green ; most of the flowers borne in pairs ; calyx 40–
 45 mm. long ; petal lamina barbulate . . *D. libanotis* Labill.
- K¹ Calyx 5–20 mm. long ; cauline leaves erect
- N. Calyx widest at base, narrower above . . *D. anatolicus* Boiss.
- N¹ Calyx cylindrical (uniform width)
- O. Calyx scales 4 or 6 ; petal lamina dentate
- P. Petal lamina oblong or cuneate, c. 2 mm. wide with c. 6 teeth
 on the outer border, not barbulate
- Q. Lower internodes smooth
D. floribundus Boiss. var. *floribundus*

Q¹. Lower internodes pruinose-scabrid

D. floribundus var. *pruinusos* Boiss.

P¹ Petal lamina obovate or round, shallowly dentate, barbulate

*Ludlow-Hewitt 1521

O¹ Calyx scales 8; petal lamina entire, sinuate or shortly bifid *D. siphonocalyx* Blakelock

***Dianthus anatolicus* Boiss.**

Zohary p. 53 (1950) records this species from the Amadia, Rowanduz and Sulaimaniya areas.

***Dianthus basianicus* Boiss. et Hausskn.**

In arenosis, Derbent-i-basian, Kurdistan, June 1867, *Haussknecht* (isotype); Jarmo, Kirkuk liwa, 2800 ft., eroded soil slope, 23.5.1955, *Haines* W245; Jarmo, Kirkuk liwa, dry slopes between Camp and south wadi, woody base, white, 19.5.1955, *Helbaek* 1820.

Boissier's original description [Fl. Or. Suppl. 78 (1888)] does not correspond exactly with the *Haussknecht* specimen at Kew, nor with the other specimens cited. These have 6 or occasionally 8 calyx scales (cf. Boissier, "squamis quaternis"), and the lower cauline leaves c. 3 cm. long (cf. "folia inferiora 6-7 lin. longa").

***Dianthus floribundus* Boiss.**

Jarmo, Kirkuk liwa, silt ridges, red outside, white inside, 1.6.1955, *Helbaek* 1995 & 1996.

These specimens differ somewhat from the Kew sheet of *Kotschy* 325 from Bingöldagh cited by Boissier. The 'Iraq plants have acute tips to the calyx scales and the petal lamina is dentate-incised to $\frac{1}{8}$ of its length, whilst *Kotschy's* plant has acuminate or aristate tips to the scales and the petal lamina cut to $\frac{1}{3}$ its length. In the shape of the calyx scales the Jarmo plants resemble *D. pachypetalus* Stapf from Persia but have somewhat smaller flowers (calyx length 16-17 mm. as compared to 20 mm. in *D. pachypetalus*). There may also be a difference in flower colour as Stapf describes his plant as having yellow-green, olive or rust-coloured petals.

Handel-Mazetti p. 152 (1912) records this species from above Bara in the Jabal Sinjar (*Handel-Mazetti* 1562) and gives *D. pachypetalus* Stapf as a synonym for *D. floribundus* Boiss.

***Dianthus floribundus* Boiss. var. *pruinusos* Boiss. Fl. Or. 1, 490 (1867).**

Boissier cites a specimen of Noë's from Mandali. Nábelek p. 39 (1923) records this variety from "ad pagum Mâr Jakub supra Simel ad septentriones ab urbe Môsul. Ad rupes alt. ca. 800 m. 27.6.1910 (no. 4263a)".

***Dianthus judaicus* Boiss.**

Montafa, 10.5.1934, *Field and Lazar* 111; S. bank opposite Rawa, Dulaim liwa, 130 m., limestone crags, dry steppe-subdesert formation,

frequent, corolla brownish outside, white inside, 28.3.1947, *Gillett and Rawi* 7053.

Distribution. Palestine, Syria, 'Iraq, Persia.

Dianthus orientalis *Adam* in *Web. et Mohr*, Beitr. Natur. **1**, 54 (1805) ; *D. orientalis* *Sims*, Bot. Mag. t. 1069 (1808) ; *D. fimbriatus* *M.B.*, Fl. Taur. Cauc. **1**, 332 (1808).

There is no satisfactory treatment of this polymorphic species and the identification of the 'Iraq material as the vars. *brachyodontus* and *macropetalus* is provisional.

Dianthus orientalis *Adam* in *Web. et Mohr* var. ***brachyodontus*** (*Boiss. et Huet*) *Bornm.* in Beih. Bot. Centralbl. **19**, 2, 212 (1906) ; *D. fimbriatus* *M.B.* var. *brachyodontus* *Boiss. et Huet*, Diagn. Sér. 2 no. 5, 53 (1856) ; *D. orientalis* *Sims* subsp. *scoparius* *Bornm.* quoad *Bornmüller* 962 [? non Fenzl].

Riwandous [Rowanduz] in m. Sakri-Sakran regione alpina 2200 m., 23.6.1893, *Bornmüller* 962 ; Chia-i-Mandali, on the rocky mountainside, in large tufts or clumps, 8000–9000 ft., 19.7.1932, *Guest & Ludlow-Hewitt* 2795 ; Jabal, E.N.E. of Seri Hassan Beg, among rocks, 7000 ft., 24.7.1932, *Guest* 2903 ; Sersang [Sarsing, Mosul liwa], cracks in vertical shady rocks, 14.7.1955, *Haines* W487.

Dianthus orientalis *Adam* var. ***macropetalus*** (*Boiss.*) *Bornm.* in Beih. Bot. Centralbl. **19**, 2, 213 (1906) ; *D. fimbriatus* *M.B.* var. *macropetalus* *Boiss.*, Fl. Or. Suppl. 77 (1888).

Chia-i-Mandali, on the stony mountainside, 1500–1800 m., 18.7.1932, *Guest* 2663 ; E. slopes of Arl Gird Dagħ [Erbil liwa], *Astragalus* thorn-cushion-zone, igneous or metamorphic rock, pink, 2000 m., 4.8.1947, *Gillett* 9516.

Dianthus pendulus *Boiss. et Bl.*

Rowanduz Gorge, shady N. wall of cliff, 600 m., 26.8.1953, *Guest* 13086 and 25.11.54, *Guest* 13611 ; Rowanduz Gorge, growing on limestone cliffs, c. 500 m., wiry herb, flowers pink, 27.10.1955, *J. K. Jackson* 15083.

These specimens have calyx scales somewhat broader and shorter than in the type.

Zohary p. 54 (1950) records this species from the Sulaimaniya area.

*Three 'Iraq gatherings of which the material is inadequate for complete determination are included in the key.

I. Sersang [Sarsing, Mosul liwa] dry steep rocky slopes under oak forest, 4500 ft., 7.7.1955 *Haines* W517.

This specimen matches *D. robustus* *Boiss. et Kotschy* closely in general habit, in foliage and in calyx scale characters, but has a capitate inflorescence with 6–8 flowers per head, and a calyx only 20–25 mm. long instead of 36–40 mm. as given by Boissier for *D. robustus*. It may represent a new species but the absence of evidence as to the variability of

D. robustus or of this 'Iraq plant makes it desirable to await further collections before describing it.

The following appears to be an immature specimen of the same species : Penjwin, Sulaimaniya liwa, mountainside, 1800 m., native name giakunjara, 9.6.1948, *Rawi* 12206.

II. Mts. S.E. of Serva near Ser Kurawa, Arbil liwa, 2000 m., *Astragalus*-thorn-cushion zone on igneous or metamorphic rock, pale pink, 9.8.1947, *Gillett* 9699.

This specimen shows an affinity with *D. anatolicus* var. *kotschyanus* Boiss. in calyx and petal characters but has a very branched woody base, lanceolate rather than linear leaves (c. 10×0.15 cm.) and obtuse and shortly mucronate calyx scales.

III. Beribedan, 9000 ft., Aug. 1931, *Ludlow-Hewitt* 1521.

See Blakelock, *Kew Bull.* **1948**, 396 (1949). This is the specimen referred to in Guest p. 29 (1933) as *D. tabrisianus* Bien. Further collections from this locality are needed to determine whether this specimen represents a form or hybrid of *D. hypochlorus* or *D. tabrisianus*.

[Zohary lists two undescribed species from 'Iraq, *D. kurdicus* Wajsm. and *D. ravanduzianus* Wajsm. The latter name may be intended for the Rowanduz plants here referred to *D. pendulus* Boiss.]

Gypsophila L.

A. Flowers sessile in spheroid heads ; leaves linear ; no persistent dead stems *G. sphaerocephala* Fenzl

A¹ Flowers in a loose panicle, pedicellate ; other characters various

B. Claw of petal tapering gradually into the lamina ; other characters various

C. Calyx \pm campanulate

D. Dead stems persistent ; plant up to 18 cm. tall ; 2-9 flowers on each stem *G. nabelekii* Schischk.

D¹ No persistent dead stems ; plant often taller ; inflorescence many-flowered

E. Leaves rarely reticulate nerved, not cordate at base

F. Leaves glandular-pubescent

G. Flowers at least the lower ones borne singly on slender pedicels in leaf-axils ; petals about as long as sepals or half as long again ; leaves up to 5 mm. wide ; annual or perennial

H. Lower leaves oblong-spathulate, up to 2.3 cm. long, 5 mm. wide ; only one pair of stem-leaves below inflorescence ; panicle not leafy ; annual sometimes perennial

G. alsinoides Bunge

H¹ Leaves linear or oblong-linear, up to 4 cm. long, 3 mm. wide ; often several pairs of stem-leaves ; panicle leafy ; annual

G. trichopoda Boiss.

- G.¹ Flowers all in a terminal panicle ; petals longer than sepals up to twice as long ; leaves oblong-elliptic, obtuse, up to 8 cm. long, 3 cm. wide ; 6 or more pairs of stem-leaves below inflorescence ; perennial *G. anatolica* Boiss. et Heldr.

F.¹ Leaves glabrous or scabrid-papillose

- H. Petals 8–12 mm. long ; calyx narrowly campanulate ; leaves acute ; perennial *G. venusta* Fenzl

- H.¹ Petals up to 7 mm. long ; calyx campanulate ; leaves various ; annual or perennial

- I. Leaves rigid, glaucous, \pm 3-nerved, nerves often anastomosing, up to 2.5 cm. long, 5 mm. wide ; perennial woody at the base *G. aucheri* Boiss.

- I.¹ Leaves softer, green or glaucous, 1–3-nerved, nerves not anastomosing, larger ; annual or perennial

J. Petals 5 mm. or more long

- K. Inflorescence very diffuse and divaricate ; capsule c. 2 mm. long ; leaves up to 7 mm. wide, lower leaves oblong-lanceolate, upper leaves linear-lanceolate ; petals about twice as long as sepals ; perennial (always ?)

G. capillaris (Forsk.) C. Chr.

- K.¹ Inflorescence less diffuse ; capsule 3–5 mm. long ; annual or perennial

- L. Plant up to 60 cm. ; leaves glaucous narrowly to widely elliptic, up to 5 cm. long, 1.7 cm. wide ; petals white with inconspicuous veins ; capsule 3–4 mm. long ; perennial *G. polyclada* Fenzl

- [L.¹ Plant up to 40 cm. tall but generally less ; leaves green linear-lanceolate, oblong-spathulate or oblong ; petals pink with conspicuous veins ; capsule 3–5 mm. long ; annual *G. elegans* M.B.]

J.¹ Petals up to 4 mm. long

- M. Lower flowers often single in leaf-axils ; only one pair of stem-leaves ; pedicels in flower 6–16 mm. long, in fruit up to 62 mm. long ; perennial or annual

G. alsinoides Bunge

- M.¹ Flowers in a terminal panicle ; often several pairs of stem leaves ; pedicels in flower 1–8 mm. long, in fruit up to 16 mm. long *G. heteropoda* Freyn

- E.¹ Leaves reticulate nerved, cordate at base *G. ruscifolia* Boiss.

C.¹ Calyx cylindrical

- N. Leaves linear up to 1.5 mm. wide, often absent at flowering time *G. gypsumiloides* (Fenzl)

N.¹ Leaves oblong-elliptic to ovate up to 28 cm. wide ; plant leafy at flowering time *G. platyphylla* Boiss.

B.¹ Claws of petals sharply constricted just below lamina ; stem with long dense glandular hairs ; lower flowers solitary on thin pedicels in leaf-axils *G. porrigens* (L.) Boiss.

A treatment of the genus is given by G. Stroh (in Beih. Bot. Centralbl. **49**, 455–477 : 1939), who bases his enumeration on Pax and Hoffman's subdivision of the genus (in Pflanzenfam. **16c**, 351–356 : 1934). His primary division is into annual and perennial species ; although this may be theoretically sound, it is not a convenient key character as some species (e.g. *G. melampoda* and possibly *G. capillaris*) can be either annual or perennating. An artificial key has therefore been given above.

There is a note on the cultivated species of *Gypsophila* by G. H. M. Lawrence in *Baileya* **1**, 16–18 (1953).

***Gypsophila alsinoides* Bunge (*G. melampoda* Bien.).**

Boissier (Fl. Or. Suppl. 88) records this as collected by Haussknecht near Mosul and Arbil under the name *G. melampoda* Bien. No material from 'Iraq has been seen, but Persian material at Kew ; between Aghda and Mt. Ghumber and Isfahan, May 1859, *Bunge* [type material of *G. melampoda*]; between Kerman and Jesd, Apr. 1859, *Bunge* (14-ovulate) ; E. Iran, 4000–6000 ft., cultivated soil and stream banks, small white flowers, Apr. 1936, *E. Daly* 75 (8-ovulate) suggest that *G. melampoda* is only large and sometimes perennating specimens of *G. alsinoides*. It should be noted that *G. alsinoides* from Afghanistan (*Griffiths* 422, *Aitchison* 531) are 8- and 11-ovulate ; from Beluchistan (*Stocks* 970) is 6-ovulate ; from Turkestan (*Komarov* 31.5.1893) is 10-ovulate, so that Boissier's character, *G. alsinoides* "sexovulatum" and *G. melampoda* "12–16-ovulatum", does not appear very reliable.

Distr. 'Iraq, Pers., Afghan., Baluch., Turkestan.

***Gypsophila anatolica* Boiss. et Heldr. (*G. trichotoma* Wenderoth var. *anatolica* Bornm.).**

Handel-Mazzetti (p. 151) records this from "Auf nacktem Salzboden und auf Gips am See El Chattunije (Nr. 1636)". This locality is near the Jabal Sinjar, about 2 miles W. of the Syrian border. Zohary, p. 55 (1950) lists this species from the Jazira.

The species is very close to *G. polyclada* Boiss. except for the indumentum.

Schischkin (Fl. USSR. **6**, 732, 759, 762 : 1936) distinguishes *G. trichotoma* and *G. anatolica* as follows :

G. anatolica pedicel equal to or 1.5–2 times longer than the calyx ; petals rose. Cauc., As. Min., Pers.

G. trichotoma pedicel hairy 3–6 times longer than calyx ; petals dark red. European Russia, W. Siberia, Central Asia, also Roumania, Bulgaria and Persia.

Gypsophila aucheri Boiss. (*G. haussknechtii* Boiss.; *G. pallida* Stapf ex Bornm. in Beih. Bot. Centralbl. **28**, 136 (1911)).

In deserto Singarae, May 1867, *Haussknecht* 184 : Riwandous [Row-anduz] ad fines Pers., in monte Händarin, 1300 m., 13.5.1893, *Bornmüller* 954 ; c. 12 km. east of Chemchemal, Kirkuk liwa, c. 800 m., sandy rocky soil, all trees destroyed, rootstock woody, white, 3.6.1948, *Gillett and Rawi* 11609 ; Jarmo, Kirkuk liwa, dry silt above South wadi, white, woody base, 17.5.1955, *Helbaek* 1798 ; Jarmo, 2500 ft., open dry stony slopes, late May 1955, *Haines* W358.

Bornmüller (p. 137) points out that this species belongs to the Section *Suffruticosae* not Section *Paniculatae* in Boissier's subdivision of the genus. Authenticated material of *G. pallida* Stapf has not been seen and there is some doubt as to the affinities of Stapf's species. *G. damascena* Boiss. is probably not distinct from *G. aucheri*.

Distr. As. Min.

Gypsophila capillaris (Forsk.) C. Chr. (*G. rokejeka* Del.).

Kor Mor [?], 30 miles from Tuz, 1500 ft., 9.6.1929, *Rogers* 0311 ; Qaiyara, Mosul, 640 ft., common among the withered plants of 79 *Hordeum murinum* L. 82 *Stipa tortilis* Desf., erect branching annual white flowers and greyish green leaves, 15.5.1939, *Bayliss* 123 ; Jabal Hamrin, where crossed by Baquba-Khanaqin road, Diyala liwa, 150 m., sandy gypsaceous hills, border of subdesert and steppe, common, white, 11.4.1947, *Gillett and Rawi* 7323 ; 6 km. west of Tal Afar, Mosul liwa, 500 m., steppe on limestone, common, white, 27.5.1948, *Gillett* 11169 ; 8 km. east of Kirkuk, c. 500 m., steppe, sandy rock soil, seems sometimes annual sometimes perhaps biennial, common, 3.6.1948, *Gillett and Rawi* 11597 ; Baghdad, Felluja Desert, common, open sandy plains, 16.4.1955, *Haines* W167 ; Southern Desert, about 35 km. E. by S. of Shabicha, c. 275 m., stony sub-desert, flowers about white, 13.4.1955, *Guest, Rawi and Long* 14072 ; S. Desert, about 15 km. E. by N. Busaiya, c. 120 m., rather sandy "haswa" (gravel plain), frequent, white, 15.4.1955, *Guest and Rawi* 14220 ; S. Desert, about 45 km. S.E. by E. Busaiya, c. 150 m., rather sandy "haswa", frequent, pale pinkish-white flowers, colloquial name gailaijean, 16.4.1955, *Guest and Rawi* 14243 ; Jabal Sanam (Basra-Kuwait border), 100–150 m., volcanic rocky slopes with sandy places, frequent, whitish flowers, 17.4.1955, *Guest, Rawi and Schwan* 14388 ; 90 km. N. of Shabicha, 200 m., sandy soil, flowers light pink, rare, 15.3.1955, *Rawi* 14825 ; 50 km. N. of As-Salman, 200 m., stony plain, rare, 17.3.1955, *Rawi* 14863.

For synonymy see Burtt and Lewis in Kew Bull. 333 (1952). This seems to be a perennial species which often flowers in its first year, as far as can be judged from herbarium material. There are 1–6 pairs of leaves on the stem below the inflorescence in this species.

[**Gypsophila elegans** M.B.]

Only known in 'Iraq from gardens at Rustam (*Yussef Lazar* 3924)].

Gypsophila gypsophiloides (Fenzl) comb. nov. (*Ankyropetalum gypsophiloides* Fenzl).

Mesopotamia, *Aucher-Eloy* 552 (B.M.) ; in rupestribus apricis pr. p. Gara Kurdist., July 1841, *Kotschy* 406 (B.M.) ; inter Erbil [Arbil] et Kirkuk Assyriae, May 1867, *Haussknecht* (B.M.) ; Riwandous [Rowanduz] ad fines Pers., in monte Händarin [Handren], 1300 m., 16.6.1893, *Bornmüller* 953 ; Sulaimaniya, 5-6.7.1934, *Field and Yussef Lazar* 969 ; foot of Mahmoud Dag, Arbil liwa, 500 m., steppe on stony limestone slopes, occasional, white, 30.5.1948, *Gillett* 11248 ; near Brizia, Arbil liwa, 750 m., open areas, *Quercus* formation destroyed, frequent, cream opening in the evening, 7.8.1947, *Gillett* 9637 ; Jarmo, Kirkuk liwa, dry silt ridges above camp, yellowish, spreading, 29.5.1955, *Helbaek* 1984.

Bornmüller 953, *Field and Yussef Lazar* 969 and *Gillett* 11248 are var. *glandulosa* Bornm. which was originally described as "caulibus inferne dense glanduloso-pilosis, ramis paniculatae partim calycibusque sparse glandulosis". *Bornmüller* 953 is cited as the type of the variety p. 136 (1911).

The genus *Ankyropetalum* Fenzl, maintained by Boissier, was regarded as a subgenus of *Gypsophila* by Williams (in Journ. Bot. **27**, 322 : 1889). Pax and Hoffmann and Stroh also include it in *Gypsophila*. The combination *Gypsophila gypsophiloides* does not appear, however, to have been made.

Gypsophila heteropoda Freyn et Sint. (*G. minutiflora* Haussk. et Bornm. ; *G. nanella* Grossh. et Schischk.).

Mesopotamia, "Jebel Samara" [Jabal Sanam ?], 23.8.1919, *G. A. Watson* ; 5 km. east of As Salman, Southern desert, 250 m., subdesert sandy slopes whitish, 2 plants only, 24.2.1947, *Gillett and Rawi* 6189.

Distr. Cauc., As. Min., 'Iraq, N. Pers., Transcasp.

Gypsophila nabelekii Schischk. (*G. lignosa* Náb.) e descr.

Eastern slopes of Arl Gird Dag, Arbil liwa, 2860 m., *Astragalus*-thorn-cushion-zone on igneous or metamorphic rock, pale pinkish, 5.8.1947, *Gillett* 9615.

This gathering shows almost glabrous stems, 2-6 flowers on each stem and leaves which are scabrid only on the margins. The petals are retuse. Except for the less dense indumentum the plant is a good match for *Guest and Ludlow-Hewitt* 2873.

Gypsophila platyphylla Boiss. (*G. boissieriana* Hausskn. et Bornm.).

In gramin. Pir Omar Gudrun, June 1867; *Haussknecht* ; Ruwandous [Rowanduz], ad fines Pers. in m. Sakri-Sakran regione alpina, 2100 m., 23.6.1893, *Bornmüller* 957 (type material of *G. boissieriana*).

The flower size and narrow calyx of this species show some resemblance to *G. venusta*, but *G. platyphylla* has obtuse (not acute) leaves and a glandular-pubescent (not glabrous) inflorescence.

Gypsophila polyclada Fenzl

Assyria deserta, *Aucher-Eloy* 548 ; Mergadreija near Haji Omran, Arbil liwa, 1800 m., mountainside, white, native name meshula, 21.6.

1947, *Rawi* 9130 ; Qara Dagh, Sulaimaniya liwa, 1400 m., by field in *Quercus* forest, limestone, white, 23.4.1947, *Gillett* 7932.

Aucher-Eloy's specimens may not be from 'Iraq. Zohary (p. 55) records this from the Kirkuk and Sulaimaniya areas.

***Gypsophila porrigens* (L.) Boiss.**

Ditionis Kirkuk in cultis, 400 m., 28.4.1893, *Bornmüller* 956 ; 34 km. east of Mosul, Mosul liwa, 300 m., moist type steppe, deep soil, in wadi, common, white-faint pink, stems very brittle, 28.5.1948, *Gillett* 11176 ; Tarmiya, Baghdad, many individuals in dense stand with interlacing branches, overflow patch from irrigation ditch, 2.5.1955, *Haines* W122 ; Nimrud, from mound (pastures and trenches), white or purple, 20.4.1955, *Helbaek* 946, 947 ; Jarmo, Kirkuk liwa, wheat field, pinkish white, 25.4.1955, *Helbaek* 1166.

***Gypsophila sphaerocephala* Fenzl**

In saxosis m. Gara Kurdist., flos albus, July 1841, *Kotschy* 318 ; Sersang [Sarsing, Mosul liwa], 5000 ft., 14.7.1955, *Haines* W494.

***Gypsophila trichopoda* Boiss. (*G. linearifolia* auct.).**

In sals. deserti Singarae, May 1867, *Hausknecht* ; Mesopotamia, *Watson* ; Qaiyara, Mosul, 640 ft., common very saline dry ground especially where the soil has been recently disturbed and usually the only species in such situations, but 109 [*Antirrhinum ceratotheca*] sometimes associated, erect annual with spreading branches very viscid, flowers white, 25.4.1939, *Bayliss* 104.

Also recorded by *Bornmüller* (p. 138) from near Kirkuk and Altun Kopri by *Handel-Mazzetti* (p. 151) from near Acra and by Zohary from the Kirkuk district. According to *Stroh* the true *G. linearifolia* (F. et M.) Boiss. is only found in the region N. and E. of the Caspian Sea, but the two species are very closely related.

Distr. Asia Minor, 'Iraq.

***Gypsophila venusta* Fenzl**

In gramin. Pir Omar Gudrun, June 1867, *Hausknecht* 182 (B.M.).

***Habrosia spinuliflora* (Ser.) Fenzl**

In montis Kuh-Sefin reg. infer. supra pagum Schaklava [Shaqlawaa] (ditionis Erbil [Arbil]), 1050 m., 15.5.1893, *Bornmüller* 949 ; Jabal Hamrin, *Sutherland* 112 (B.M.) ; Dohuk, Mosul liwa, 600 m., in crevices of limestone rocks on hot S. slope of hill, 1.5.1951, *Mooney* 4318 ; Khormal, Sulaimaniya liwa, 900 m., 21.4.1947, *Rawi* 8857 ; Jabal Sinjar north of the town, Mosul liwa, 900 m., coppiced *Quercus aegilops* forest on limestone, locally abundant, greenish yellow, 26.5.1948, *Gillett* 11091 ; Acra, Mosul liwa, 30.5.1948, *Rawi* 11305 ; Jarmo, wild land or old fallow or comparatively dry silt, 9-15.3 and 8.4.1955, *Helbaek* 357,702.

***Herniaria* L.**

A. Tepals 5, equal or subequal, not fleshy, hairy, acute

B. Flowers sessile *H. hirsuta* L.

- B¹ Flowers shortly pedicellate *H. incana* Lam.
- A¹ Tepals 4, unequal, fleshy, \pm rounded at apex
- C. Outer tepals cucullate, rounded at apex, less attenuate at base ;
inner tepals about half the size of the outer
H. arabica Hand.-Mazz.
- C¹ Outer tepals not cucullate, rounded-obtuse at apex, more attenuate
at base ; inner tepals about a quarter the size of the outer ones
H. hemistemon J. Gay

***Herniaria arabica* Hand.-Mazz.**

15 km. west of Ramadi in road to Hit, Duleim liwa, 60 m., gypsaceous sandy sub-desert, common, leaves whitish, 24.3.1947, *Gillett and Rawi* 6799 ; Haditha, Duleim liwa, 120 m., dry steppe climate, 26.3.1947, *Gillett and Rawi* 6905.

Handel-Mazzetti cites "am rechten Euphratufer bie Kaijim unter Abukemal (Nr. 649) in Wadi Sradan bei Haditha (Nr. 775) in Kieswüste, ebenso zwischen Beled und Samarra am rechten Ufer der Tigris ober Baghdad" (Ann. K.K. Nat. Hofmus. Wien. **26**, 145 : 1912).

Distr. Syria, 'Iraq.

***Herniaria hirsuta* L. s.l.**

Baghdad, 20.4.1893, *Bornmüller* 948 ; Jabal Hamrin, Mar. 1917, *Sutherland* 116 (B.M.) ; Cotton Farm, Karada, near water channels, 10.5.1920, *Graham* ; Rustam, Mar. 1929, *Rogers* 085 (B.M.) ; near Daltawa, Mar. 1929, *Rogers* 0328 ; Rustam Farm, Baghdad, 25.4.1933, *Yussef Lazar* 190 ; Ain Tellawi near Mosul, 16.5.1946, *Rawi* 5795 ; 60 km. S. of Samawwa, S. desert, c. 130 m., alluvial patch in limestone desert, occasional, 23.2.1947, *Gillett & Rawi* 6170 ; c. 10 km. N. of As Salman, Southern desert, c. 250 m., sandy wadi with *Zizyphus nummularia*, 23.2.1947, *Gillett & Rawi* 6182 ; Zafraniya, Baghdad liwa, 30 m., sub-desert alluvium, open waste place, occasional, greenish, 10.3.1948, *Gillett & Rawi* 10186 ; Kursi, Jabal Sinjar, Mosul liwa, c. 650 m., stony places, limestone with relics of *Quercus aegilops* forest, occasional, 23.5.1948, *Gillett* 10909 ; Baghdad, Tarmiya, land recently flooded by canal overflow, 2.5.1955, *Haines* W142 ; Wadi al-Ghadhaf (between Rutba and Nukhaib), 550 m., 200 m., sandy desert and plain clay soil, rare, 11 and 16.3.1955, *Rawi* 14734, 14846.

Hermann in Fedde Repert. **52**, 215 (1937) and in Ann. Nat. Mus. Wien **51**, 393 (1940) recognizes these varieties of this species :—

- A. Hairs on tepal somewhat shorter than the width of the base of the tepal
- B. Hairs on tepals not hooked at their apices ; one or more long bristles towards the apex of the tepals ; leaves ciliate with short bristles, often also present on the surface var. *hirsuta*
- B. Hairs short, hooked at their apices var. *hamata* Herm.

A¹ Hairs on tepals mostly or all longer than the width of the tepal-base
var. *cinerea* (DC.) Loret et Barr.

Var. *hamata* Herm. has been recorded from Palestine and Persia, but not from 'Iraq.

Anthony p. 296 (1935) records both *H. cinerea* DC. from Jabal Hamrin and Amara, and *H. hirsuta* L. from Jabal Hamrin and Basra.

Rechinger f. Fl. Aegaea 128 : 1943 has a note on the varieties of *H. hirsuta*, in which he mentions intermediates between var. *cinerea* and *hirsuta* s. str. There is some doubt as to whether var. *cinerea* (DC.) Loret et Barr. has straight or hooked hairs on the tepals.

Lousley in Watsonia **1**, 318 : 1950 regards *H. hirsuta* and *cinerea* as distinct species citing British material. The same view is taken by Fournier Quatre Fl. de la France 289 (1946). *H. cinerea* DC. Fl. Franç. Suppl. **6**, 375 (1915) was based on material collected by Pouzin "dans les environs de Montpellier entre les Crès et Castelnau". This has not been seen. The figure given by De Candolle Paronych. (Coll. Mém. 4) t. 3 (1829) shows tepals with short unhooked bristles, but this is possibly rather diagrammatic. Material from Montpellier (Herb. J. Gay, July 1846, *S. Hilaire*) at Kew shows hooked as well as straight bristles.

All the material from 'Iraq at Kew and at the British Museum cited above, as well as that previously listed in "The Rustam Herbarium" in Kew Bull. 444 : 1950 has at least some of the hairs on the tepals hooked at their apex and longer than the width of the tepal. For the present it seems most convenient to identify it as *H. hirsuta* L. s.l. If a varietal name must be given, then it should be placed in var. *cinerea* (DC.) Loret et Barr.

***Herniaria incana* Lam.**

Recorded by Anthony p. 296 (1935) from Jabal Hamrin.

***Holosteum* L.**

A. Sepals and pedicels glabrous or sparsely glandular ; stamens 3-4
H. umbellatum L.

A.¹ Sepals and pedicels \pm densely glandular ; stamens 8-10
H. glutinosum (M.B.) F. et M.

***Lepyrodiclis holosteoides* (C.A.M.) Fenzl**

Sefin Dag above Shaqlawa, Arbil liwa, 1350 m., shaded limestone rocks, *Quercus* forest formation, corolla white, 9.5.1947, Gillett 8166.

Bornmüller (p. 147) as well as Pax and Hoffmann maintain *Lepyrodiclis* Fenzl ex Endl. as a separate genus ; Williams in Journ. Linn. Soc. **33**, 427 (1898) regarded it as a section of *Arenaria*. (see key to *Stellaria* p. 216).

***Loeflingia hispanica* L.**

Near Baghdad, Apr. 1933, *Yussef Lazar* 79 ; Southern Desert, about 10 km. E. by N. of Busaiya, c. 125 m., "haswa" (gravel plain) slightly sandy, native name shuwail, 15.4.1955, *Guest and Rawi* 14226 ; Southern Desert, about 80 km. E.S.E. of Busaiya, subdesert (type unrecorded but sandy), occasional, 16.4.1955, *Guest and Rawi* 14300 ; Msaieda-Fakka, 20 m., pasture land, clay soil, rare, 21.4.1955, *Rawi* 14936.

Melandrium *Roehl.*

A. Fruiting calyx up to 2 cm. wide . . . *M. ericalycinum* Boiss.

A¹ Fruiting calyx up to 4 cm. wide

M. physocalycinum Haussk. et Bornm.

Melandrium ericalycinum *Boiss.*

In montis Kuh-Sefin reg. infer. supra pagum Schaklava (ditionis Erbil) [Shaqlawā, Arbīl], 12–1600 m., 1.5.1893, *Bornmüller* 964 [at Kew] ; Jabal Baradost near Diana Rowanduz, 28–29.6.1934, *Field and Yussef Lazar* 894, 927 ; Sefin Dagħ above Shaqlawa, Arbīl liwa, 1300–1400 m., steep limestone mountain with *Quercus* forest, shady places, corolla cream, fruiting calyx much enlarged [up to 2 cm. long, 2 cm. wide], 9.5.1947, *Gillett* 8162 ; eastern slopes of Arl Gird Dagħ, Arbīl liwa, 2000 m., by cereal field, white, 5.8.1947, *Gillett* 9529 ; Shaqlawa, 4000 ft., frequent in shady rocks on N. face, 12.5.56, *Haines* W611.

Bornmüller 964 is cited by number as *M. physocalycinum* Hausskn. et Bornm. (Bornm. p. 146). The fruiting calyx on the specimen at Kew is only 2.5 cm. long and 2 cm. wide although Bornmüller's description says up to 3.5 cm. long and 4 cm. wide ; in other respects it is a good match for *M. ericalycinum*. There is some doubt if this discrepancy is due to a misplaced label, to Bornmüller's description referring to an abnormal specimen, or perhaps to immaturity of the Kew specimen.

Melandrium physocalycinum *Hausskn. et Bornm. e descr.*

Bornmüller p. 146 (1911) records this : " Gebirge östlich von Erbil (Kurdistan) felsige Abhänge des Kuh-i-Sefin, oberhalb Schaklawā, 1200 bis 1600 m. (21.v.1893 ; no. 964)."

See note under preceding species.

Minuartia *L.* (for key to species see **Arenaria**). This genus seems rather artificially separated from *Arenaria*.

Minuartia aucheriana (*Boiss.*) *Bornm.* (*M. lineata* (C.A.M.) *Bornm.*).

Matina, Mosul liwa, 1800 m., 15.5.1947, *Rawi* 8740 ; Kodo near Haji Omran, Arbīl liwa, 2700 m., white, 22.6.1947, *Rawi* 9203 ; Ser Kurawā, Arbīl liwa, 3100 m., shady crannies in subalpine igneous rocks, only one tuft, white, 11.8.1946, *Gillett* 9746 ; Arl Gird Dagħ, Arbīl liwa, 3600 m., igneous alpine rocks, frequent, white, 24.8.1948, *Gillett* 12366.

M. lineata and *M. aucheriana* were kept separate by Mattfield (in Fedde Rep. Sp. Nov. Beih. **15**, 156 : 1922) mainly on the general size of the plants, but specimens, such as *Guest* 3060 and *Rechinger* f. 908, are intermediate in size between the most laxly growing specimens (*Rawi* 8740) and the densely caespitose plants (*Rawi* 9203, *Kotschy* 773).

The species is very close to *M. erythrosepala* (Boiss.) Hand.-Mazz., but the leafy shoots towards the base are not so strict, as well as the calyx characters being different. The record of *M. erythrosepala* from 'Iraq (*Guest* p. 63 : 1933 and *Zohary* p. 50 : 1950) is founded on a misidentification of Mr. Horwood's (*Ludlow-Hewitt* 1532 which is *M. recurva*).

Distr. As. Min., N. 'Iraq, Pers.

Minuartia hamata (Haussk.) Mattf. (*Queria hispanica* L.).

Kursi, Jabal Sinjar, Mosul liwa, 800 m., bare limestone slopes with relics of *Quercus aegilops* forest, locally common, 23.5.1948, Gillett 10970 ; Penjwin, Sulaimaniya liwa, 1700 m., occasional, native name gia merga (Kurdish), 9.6.1948, Rawi 12246 ; Palegawra, 1000 m., spur on a ridge in the Kurdish foothills west of Sagirma Dag, 15 miles S.W. of Pir i'Mukhrun [Pir Omar Gudrun] of the Zagros mountains, steep calcareous sandstone, rainfall obviously better than at Jarmo, white-green, 6.4.1955, Helbaek 682 ; Shaqlawa, 2800 ft., frequent on dry sunny bank, 11.5.1956, Haines W667.

Mattfeld (l.c. p. 71) has a note on the nomenclature of this species.

Minuartia intermedia (Boiss.) Hand.-Mazz.

Jabal Sinjar north of the town, 900–1200 m., limestone mt. with coppiced *Quercus aegilops* forest, occasional, corolla white, calyx pungent, 26.5.1948, Gillett 11101, 11101A.

Possibly not specifically distinct from *M. decipiens* (Fenzl) Bornm.

Minuartia meyeri (Boiss.) Bornm.

Zohary p. 50 (1950) and Handel-Mazzetti (p. 148) record this from Jabal Sinjar.

Minuartia montana Loefl.

Bornmüller (p. 148) records this from "Assyrien : Abhänge des Kuh-i-Sefin, 900 m. (9.v.1893 ; no. 987)."

Minuartia recurva (All.) Schinz & Thell. var. **hirsuta** (M.B.) Boiss. (*M. hirsuta* (M.B.) Hand.-Mazz.).

N.E. slopes of Arl Gird Dag, Arbil liwa, 3000 m., subalpine zone on igneous or metamorphic rock, forming a cushion, corolla white, 5.8.1947, Gillett 9593.

Mattfeld (l.c. p. 51) maintains this variety as a separate species, but the presence of glandular hairs on calyx, pedicel and upper stem seems the only valid difference. The typical glabrous variety, as well as nearly glabrous plants, occur on Arl Gird Dag (Guest 2840).

Minuartia tenuifolia (L.) Hiern s.l. in Journ. Bot. 321 (1899) (*Arenaria tenuifolia* L. s.l.).

Qaiyara, Mosul liwa, 640 ft., dry saline soil, erect annual, flowers white, Bayliss 92 ; Qaranjir between Kirkuk and Chemchemal, Kirkuk liwa, 700 m., moist type steppe verging on forest climate, by irrigation channel, occasional, white, 14.4.1947, Gillett and Rawi 7544 ; Rowanduz gorge, Arbil liwa, 500 m., shady limestone rocks, corolla white, stems glandular pubescent, 16.5.1947, Gillett 8327 ; do., stems glabrous, Gillett 8328 ; Eski Kellek, Mosul liwa, 230 m., moist steppe, dry stony slopes, chiefly N. aspect, locally frequent, white, 23.3.1948, Gillett & Rawi 10395 ; Great Zab near Kau Gossik, Arbil liwa, 250 m., sand-banks moist steppe climate, common, petals white not notched, 28.3.

1948, *Gillett & Rawi* 10534 ; Kursi, Jabal Sinjar, Mosul liwa, 700 m., open stony places, limestone with relics of *Quercus* forest, common, white, 23.5.1948, *Gillett* 10905 ; Jabal Sinjar north of the town, c. 1000 m., limestone mt. with coppiced *Quercus* forest, white, 26.5.1948, *Gillett* 11120 ; Acra, Mosul liwa, 30.5.1948, *Rawi* 11306A ; Jarmo, Kirkuk liwa, wild land or old fallow, white, 9-15.3.1955, *Helbaek* 355 ; Palegawra, 1000 m., spur on ridge in the Kurdish foothills west of Sagirrma Dagħ, 15 miles S.W. of Pir i' Mukhrun [Pir Omar Gudrun] of the Zagros mountains, steep calcareous sandstone, rainfall obviously better than at Jarmo, along creek 50 m. beneath mountain top, 6.4.1955, *Helbaek* 683, 684.

Mattfeld (l.c. map 3) records two other species in this section (*Tenuifoliae* Mattfeld) as occurring in 'Iraq although he does not cite any specimens from there. The three species are distinguished by Mattfeld (p. 33) as on the key below, but the characters separating them seem very slight.

- A. Stems branched from the base, decumbent ; leaves somewhat fleshy ; sepals widely linear-ovate, 3.5-4 mm. long ; petals wide ovate as long as sepals or half as long again ; capsule ovoid, equalling calyx or exceeding it by a third part

M. mesogitana (Boiss.) Hand.-Mazz.

- A¹ Stems \pm strictly erect

- B. Calyx ovoid or subglobose, base attenuate into pedicel which is incrassate above ; sepals wide ovate, subacute, 2-2.5 mm. long, nerves less prominent, thin and almost membranous, mostly very glabrous rarely sparsely glandular ; capsule ovoid also equalling calyx ; leaves often 1-nerved rarely 3-nerved at the base

M. subtilis (Fenzl) Hand.-Mazz.

- B¹ Calyx \pm truncate at base (even if attenuate), ovoid or subcylindric ; leaves distinctly 3-nerved ; petals shorter than calyx rarely about as long ; capsule longer than or as long as calyx ; other characters very variable *M. tenuifolia* (L.) Hiern

There is a *Minuartia tenuifolia* Nees ex Martius Pl. Hort. Acad. Erlang. 44 (1814), but the application of this name is doubtful.

Paronychia Juss.

- A. Tepals herbaceous, not cucullate nor mucronate at apex, unequal ; leaves pubescent, \pm obtuse *P. kurdica* Boiss.

- A¹ Tepals with a scarious margin, cucullate with a mucro just below apex ; leaves glabrous or scabrid

- B. Tepals with straight hairs outside ; papery " bracts " (stipules) at least twice length of tepals ; leaves generally wider, glabrous or scabrid, apex acute or with short spine at apex . . . *P. argentea* Lam.

- B¹ Tepals with hooked hairs outside ; papery bracts $1\frac{1}{2}$ times or less length of tepals ; leaves ending in a short spine

P. arabica (L.) Del. s.l.

***Paronychia arabica* (L.) Del. s.l.**

Jabal Hamrin, *Sutherland* 118 (B.M.) ; about 10 km. S. of Zubair, Basra liwa, 20 m., sandy gravelly subdesert, 13.2.1947, *Gillett and Rawi* 6075 ; same loc., flowers greenish, 17.2.1947, *Gillett and Rawi* 6111 ; 5 km. east of As Salman, Southern desert, 200 m., sandy stony ground, 24.2.1947, *Gillett and Rawi* 6198 ; 5 km. west of Karbala, Karbala liwa, 80 m., sandy-gypsaceous subdesert, occasional, 9.3.1947, *Gillett and Rawi* 6372 ; 10 km. east of Felluja, Duleim liwa, 60 m., gravelly subdesert, occasional, 23.3.1947, *Gillett and Rawi* 6761 ; Wadi Hauran—K3, Duleim liwa, 140 m., depression in dry *Poa bulbosa* steppe with wheat, 25.3.1947, *Gillett and Rawi* 6873 ; Felluja Desert, common on sandy soil, 21.3.1955, comm. *Haines* W134 ; near Felluja, c. 40 m., undulating depression on "haswa" plain, prostrate annual, 20.2.1955, *Guest and Rawi* 13638 ; Syrian Desert about 15 km. W. of Ramadi, c. 40 m., "haswa" plain, dry friable gypsum soil with small gravel, 9.3.1955, *Guest and Rawi* 13904 ; Naqaib [Nukhaib], Northern (or Western) Desert, 250 m., hard sandy gravel plain prostrate spreading herb, 12.4.1955, *Guest, Rawi and G. Long* 14042 ; Southern Desert, about 10 km. E. by N. of Busaiya, c. 125 m., "haswa" (gravel plain) slightly sandy, frequent, native name qutain, 15.4.1955, *Guest and Rawi* 14225 ; Southern Desert, c. 140 m. about 80 km. E.S.E. of Busaiya, subdesert (type unrecorded but sandy), abundant, 16.4.1955, *Guest and Rawi* 14290 ; Naqaib [Nukhaib], 250 m. sandy soil with gravel, 13.3.1955, *Rawi* 14799 ; Wadi al-Ghadhaf, 200 m., plain clay soil, frequent, 16.3.1955, *Rawi* 14843 ; 25 km. S.E. of As-Salman, 180 m., stony plain (desert), flowers white, 18.3.1955, *Rawi* 14887 ; Haswa (on road to Felluja), 40 m., sandy soil gypsaceous underneath, 24.2.1956, *Rawi* 15101 ; Southern Desert, 24 km. S. by W. of Busaiya, c. 155 m., compact loamy soil with some gravel, occasional, 29.3.56, *Guest and Ibrahim Mahallal* 15265.

Burt and Lewis in *Kew Bull.* 334 (1952) have discussed the variation in this species, in which they include *P. desertorum* Boiss. (*P. lenticulata* (Forsk.) Asch. et Schweinf.).

The 'Iraq material shows both apparently annual and perennating plants.

***Paronychia argentea* Lam.**

Recorded by Anthony p. 296 (1935) from Zubair, and by Zohary from Jebel Jidra wa Judran (389 km. W. of Baghdad ; between Wadi Amij and W. Muhamadi (320 km. W. of Baghdad) ; Wadi Muhammadi, 45 km. W. of Baghdad (in *Pal. Journ. Bot. J. ser. 1*, 247 (1939).

This species is generally a perennial, but is described as being annual in parts of Palestine.

***Paronychia kurdica* Boiss. Diagn. Ser. 1,3,10 (1843).**

All the material seen of this species appears to be perennial, as far as can be estimated from herbarium specimens. Some gatherings approach *P. macrosepala* Boiss. e.g. :—

Amadia, Kurdistan, on rocks in Mazurka Gorge, c. 5000 ft., *Guest* 3780 ; Matina, Mosul liwa, 1500 m., 15.5.1947, *Rawi* 8736 ; Zewiya, Pir

Omar Gudrun, Sulaimaniya liwa, 1800 m., mountain side, native name *gia bankhoshka*, 6.6.1948, *Rawi* 12063.

The type was originally cited as "Hab. in cacumine *Kurdistaniae*, Kotschy." The only gathering from Kurdistan given by Boissier in *Fl. Or.* **1**, 744 (1867) is *Kotschy* 334 from Mt. Gara. The specimens under this number at the British Museum and at Kew are presumably isotypes.

Polycarpaea repens (Forsk.) Asch. et Schw.

Jebel Samara [Jabal Sanam ?], *Watson* ; Jabal Sanam, Basra liwa, 50 m., sandy subdesert at foot of mountain, 13.2.1947, *Gillett and Rawi* 6151 ; Southern Desert, Al-Ichrisi, 35 km. E. by N. of Busaiya, 115 m., rolling sandy plain with low dunes and sand ridges, white flowers, 15.4.1955, *Guest and Rawi* 14185.

Polycarpon L.

A. Sepals acute or mucronate ; leaves less succulent

P. tetraphyllum (L.) L.

A.¹ Sepals obtuse ; leaves more succulent . *P. succulentum* (Del.) J. Gay

Polycarpon succulentum (Del.) J. Gay

Zohary p. 52 (1950) records this from the Southern Desert.

Polycarpon tetraphyllum (L.) L.f.

Baghdad, Waziriya, Tigris bank, dry loam, 1.5.55, *Haines* W136.

Distr. Med. Reg. (Cosmop. introduced ?).

Pteranthus dichotomus Forsk. (*P. echinatus* Desf.).

Shargat, 7.3.1919, *Calder* 1958 (B.M.) ; Mesopotamia, Shaiba, *Watson* ; Qaraghan, Mar. 1929, *Rogers* 0351 ; near Daltawa, Mar. 1929, *Rogers* 0327 ; Jabal Hamrin, 29.3.1930, *Guest* 671, 680 ; Jabal Hamrin (nr. Injana), 150 m., 6.4.1931, *Guest* 1422 ; Baba Gurgur, near Kirkuk, 315 m., on light red soil by sandstone outcrop, 16.4.33, *Guest, Eig and Zohary* 5107 ; Qaiyara, Mosul liwa, 640 ft., common on dry saline hills associated with *Anisosciadium orientale* DC., small annual with greenish flowers, stem and leaves not rigid, 2.5.1939, *Baylis* 111 ; 6 km. S. of Shitatha, 80 m., gypsaceous sandy subdesert, occasional, found throughout the subdesert on broken ground and in dry stony spots in steppe, occasional, greenish flowers, 10.3.1947, *Gillett and Rawi* 6459 ; Jabal Sanam, 50 km. S. by W. of Basra, 100–150 m., rocky volcanic hillside with sandy patches, occasional, 17.4.1955, *Guest, Rawi and Schwan* 14372 ; Southern Desert, about 35 km. E. by S. of Shabicha, c. 275 m., stony subdesert, 13.4.1955, *Guest, Rawi and G. Long* 14076 ; 25 km. S. of As-Salman, 180 m., clay soil, plain, rare, 18.3.1955, *Rawi* 14904 ; Jabal Hamrin, *Sutherland* 113 (B.M.).

There is an account of the morphology of the inflorescence by Burt and Lewis in *Kew Bull.* 339 (1952).

Robbairaea delileana Milne-Redhead (*R. prostrata* (Del.) Boiss.).

Babylonia, in desertis ad Baghdad, 20.4.1893, *Bornmüller* 102 ; c. 30 km., south of Samawwa on As-Salman road, Southern desert, 100 m.,

alluvial depression flooded after rain with *Lycium* and *Iris sisyrinchium* subdesert, pale pink, 22.2.1947, *Gillett and Rawi* 6154 ; Southern Desert, c. 160 m., hard silty soil, native name argaija, abundant, flowers pinkish, 14.4.1955, *Guest, Rawi and G. Long* 14140.

There are notes on this species by Burt and Lewis in *Kew Bull.* 341 : 1952 and Milne-Redhead l.c. 452 : 1948.

Sagina L.

- A. Annual ; sepals, petals and stamens four ; sepals spreading in fruit
S. apetala L.
A.¹ Perennial ; sepals, petals five ; stamens usually 10 ; sepals adpressed to calyx in fruit *S. saginoides* (L.) Karst.

There is work on this genus by F. R. Elliston-Wright in *Journ. Bot.* **72**, 361–364, 1–8 (1934) ; **73**, 1–12 (1935).

Sagina apetala L.

Qarachitan, Sulaimaniya liwa, 900 m., damp limestone rocks near spring, flowers greenish, 18.4.1947, *Gillett* 7710.

Distr. Subcosmop.

Sagina saginoides (L.) Karst. (S. linnaei Presl)

Ser Kurawa, Arbil liwa, 3100 m., damp alpine grass slopes, igneous rock, occasional, petals white shorter than calyx entire, 11.8.1947, *Gillett* 9723, 9724.

Distr. N. Temp. Hemisphere.

Saponaria L.

- A. Calyx glabrous with 5 angles ; annual *S. vaccaria* L.
A.¹ Calyx with long dense glandular hairs
B. Annual ; petals bifid or trifid
C. Petals bifid *S. viscosa* C.A.M.
C.¹ Petals trifid *S. tridentata* Boiss.
B.¹ Perennial ; petals entire rounded at apex *S. suffruticosa* Náb.

There is a “ Monographie der Gattung Saponaria ” by G. Simmler in *Denkschr. Math.-Nat. Kl. Kais. Akad. Wiss. Wien* **85**, 1–77 [434–509] (1910).

Saponaria suffruticosa Nábělek e descr. et icon.

Nábělek describes p. 41 (1923) this species from “ districtu Berwari in fissuris rupium calcar. montis Choarra-Sia supra pagum 'Ain Nûne [Kani Mazi] inter Hašitha et Amadia, alt. ca. 1500 m., ubi sat frequens. 16.VI.1910 (No. 4181) ”.

Saponaria tridentata Boiss.

Nábělek records p. 40 (1923) this from “ distr. Berwari : ad pagum 'Ain Nûne [Kani Mazi] inter Amadia et Hašitha, inter segetes alt. ca. 1000 m. 16.VI.1910 (No. 4185) ”.

Saponaria vaccaria L.

The claw is scarcely longer than calyx, and the whole corolla is $1\frac{1}{2}$ times its length.

var. **grandiflora** Fisch. ex DC. Prodr. 1, 365 (1924).

The claw is long exserted and the whole corolla nearly twice the length of the calyx. See Burt and Lewis in Kew Bull. 342 (1952).

Saponaria liniflora Boiss. et Haussk. is recorded by Nábělek p. 40 (1923) from "inter segetes Bardad [Baghdad] (Sitt Zobeide). 23.IV.1910 (No. 4160); ad Babylon leg. Dr. Reuter (No. 4159)," but there is considerable doubt if this is distinct from *S. vaccaria*.

There is a specimen at Kew (Expdt. to the Euphrates, Chesney 185) which have been labelled *Saponaria oxyodonta* Boiss., but the specimen is doubtfully from 'Iraq, and *S. oxyodonta* may be conspecific with *S. vaccaria* L.

Saponaria viscosa C.A.M.

Nábělek p. 40 (1923) records this from "trajectus Serderrian inter Erbil (Arbela) et Rewandūz [Rowanduz] ca. 900 m., 24.III.1910 (No. 4192)".

Sclerocephalus arabicus Boiss.

Jabal Sanam, Basra liwa, 100 m., volcanic mountain and sandy wadi beds at its foot, subdesert, greenish, 13.2.1947, Gillett and Rawi 6152; Jabal Sanam, 100-150 m., volcanic rocky hillside with sandy places, abundant, 17.4.1955, Guest, Rawi and Schwan 14374.

The typification of this species is dealt with by Burt and P. Lewis in Kew Bull. 342 (1947).

Distr. Cape Verde Islands, Canary Is., Morocco, Algeria, Egypt, Nubia, Sinai, Pal., Arabia, Persia.

Silene L.

A. Annual; calyx-nerves 10-30 or obscure

B. Plant viscid

C. Uppermost bracts herbaceous

D. Plant glabrous; calyx-nerves 10, anastomosing, calyx-teeth acute *Silene muscipula* L.

D. Plant hairy or at least leaves ciliate towards base

E. Calyx-teeth acute

F. Calyx-teeth triangular

G. Plant sparsely pubescent at most; inflorescence not leafy; upper leaves reduced to \pm linear bracts

Silene rigidula Sibth.

G.¹ Plant with long dense glandular hairs on calyx and vegetative parts; inflorescence leafy; upper leaves oblong or lanceolate

H. Petals bifid or retuse *Saponaria viscosa* C.A.M.

H¹ Petals trifid *Saponaria tridentata* Boiss.

F¹ Calyx-teeth narrowly triangular to subulate

I. Calyx 10–15-nerved, not contracted at apex in fruit

J. Calyx 10-nerved, with a nerve below sinus between teeth, teeth ciliate at base ; petal much longer than calyx-teeth ; carpophore present *Silene linearis* Decne. s.l.

J¹ Calyx 15-nerved, without a nerve below sinus between teeth, teeth not ciliate at base ; petal exceeding calyx by 1 mm. or less ; no carpophore *Tunica pachygona* C.A.M.

I¹ Calyx 20–30-nerved, contracted at apex in fruit

K. Calyx 20-nerved, up to 18 mm. long . . . *Silene coniflora* Othh

K¹ Calyx 30-nerved, often longer *Silene conoidea* L.

E¹ Calyx-teeth obtuse

L. Inflorescence unilaterally racemose sometimes partly dichotomous ; leaves up to 12 mm. wide often less

M. Leaves up to 4 mm. wide, not spathulate ; lobes of petal-laminae oblong-linear each c. 1 mm. wide ; calyx 8–12 mm. long *Silene arabica* Boiss.

M¹ Leaves up to 12 mm. wide, sometimes spathulate ; lobes of petal-laminae obovate each 3.5–4 mm. wide ; calyx 12–25 mm. long *Silene villosa* Forsk.

L¹ Inflorescence dichotomous ; leaves wider, at least lower leaves spathulate *Silene atocioides* Boiss.

C¹ Uppermost bracts scarious ; plant hairy

Silene aegyptiaca (L.) L.f.

B¹ Plant not viscid

N. Uppermost bracts scarious ; plant hairy . . . *Silene dichotoma* Ehrh.

N¹ Uppermost bracts herbaceous

O. Capsule sessile ; calyx-teeth acute . . . *Silene apetala* Willd.

O¹ Carpophore present ; calyx-teeth acute, obtuse or rounded

P. Calyx-teeth rounded, 1–1.5 mm. long ; seed with a dorsal groove but not winged *Silene rubella* L.

P¹ Calyx-teeth triangular-oblong, obtuse to acute, 2–3 mm. long ; seeds with two undulate wings on back

Silene colorata subsp. *oliveriana*

A¹ Perennial ; calyx 10-nerved or nerves obscure

Q. Calyx glabrous or glabrescent, teeth sometimes ciliate ; upper internodes of stem usually viscid

R. Calyx 25–35 mm. long, teeth alternately acute and obtuse or alternately obtuse and rounded ; leaves glaucous, glabrous or at most slightly scabrid and shortly ciliate at margin, 1-nerved or nerves obscure, ending in a spine (spine up to 1 mm. long) or acuminate or acute

S. Upper leaves suborbicular, often cordate at base

Silene chlorifolia Sm.

S¹ Upper leaves narrowly lanceolate, not cordate at base

Silene chlorifolia var. *swertiifolia* (Boiss.) Rohrb.

R¹ Calyx 8–12 mm. long, teeth all rounded ; upper leaves lanceolate-linear, lower leaves pubescent or scabrid, usually 3-nerved sometimes 1–5-nerved, not ending in a spine . *Silene longipetala* Vent.s.l.

Q¹ Calyx hairy

T. Upper leaves not suborbicular

U. Calyx-teeth all obtuse or rounded

V. Calyx 8–12 mm. long, sparsely pubescent ; inflorescence paniculate more than 3-flowered ; larger leaves over 4 mm. wide

Silene longipetala Vent.s.l.

V¹ Not as above ; calyx longer or leaves narrower

W. Calyx up to 12 mm. long in flower ; inflorescence paniculate racemose more than 3-flowered ; leaves up to 4 mm. wide

X. Calyx inflated in fruit, contracted at apex

Silene ampullata Boiss.

X¹ Calyx not inflated in fruit . *Silene spergulifolia* (Willd.) M.B.

W¹ Calyx 12 or more mm. long ; leaves often wider than 4 mm.

Y. Inflorescence dichotomous, more than 3-flowered ; calyx 12–25 mm. long

Z. Calyx 12–16 mm. long *Silene aucheriana* Boiss.

Z¹ Calyx 16–25 mm. long *Silene oreophila* Boiss.

Y¹ Inflorescence 1–3-flowered ; calyx 20–35 mm. long

1. Indument glandular ; calyx 20–32 mm. long

Silene rhynchocarpa Boiss.

1¹ Indument not glandular ; calyx 26–35 mm. long

Silene stentoria Fenzl

U¹ Calyx-teeth acute or alternately acute and obtuse

2. Calyx-teeth alternately acute and obtuse ; calyx 12–18 mm. long in flower, inflated in fruit, contracted at apex ; petal-laminae fimbriate ; leaves 10–40 mm. wide . *Silene schizopetala* Bornm.

2¹ Not as above ; calyx-teeth all acute

3. Plant 35 cm. or more tall ; basal rosette of leaves withered at flowering time ; stem-leaves up to 15–40 mm. wide ; stem glandular-pubescent in upper part ; inflorescence dichotomous

Melandrium ericalycinum Boiss.

- 3¹ Plant often shorter ; basal rosette present at flowering time ; leaves narrower
4. Petals entire, rounded at apex, pink ; calyx 9 mm. long ; stem with long dense glandular hairs above

Saponaria suffruticosa Nábělek

- 4¹ Petals emarginate or bifid

5. Calyx 10–22 mm. long

6. Stem pubescent-scabrid not glandular ; calyx densely hairy not red-veined, not inflated in fruit

Silene eriocalycina Boiss.

- 6¹ Stem \pm glandular-pubescent at least in upper part ; calyx often \pm red-veined somewhat inflated in fruit not contracted at apex *Silene odontopetala* Fenzl

- 5¹ Calyx 20–37 mm. long ; upper leaves linear ; stem \pm glandular-pubescent . . . *Silene commelinifolia* var. *eremicana*

- T¹ Upper leaves suborbicular

7. Calyx 20–37 mm. long ; leaves less densely pubescent

Silene commelinifolia Boiss.

- 7¹ Calyx 8–10 mm. long ; leaves densely pubescent

Silene monantha Boiss. et Haussk.

This key is artificial and not to be taken as expressing any views on phylogeny or natural classification of the genus. For the sake of convenience *Melandrium*, *Saponaria* and *Tunica* are included although they are treated as separate in the key to the genera (p. 177). In any case the genera *Melandrium* and *Saponaria* are somewhat artificially divided from *Silene*. The characters used in the generic key (p. 178) are taken from the literature and may not hold in all Oriental material.

There are two monographs of *Silene*—P. Rohrbach " Monographie der Gattung *Silene* " 1868 and F. N. Williams " A Revision of the Genus *Silene*, Linn." in Journ. Linn. Soc. **32**, 1–196 (1898).

***Silene aegyptiaca* (L.) L. fil. (*S. atocion* Murr.).**

Mosul, 16.3.1930, *Rogers* 0542.

Zohary p. 56 (1950) records this from the Jabal Sinjar, Amadia and Rowanduz areas.

***Silene arabica* Boiss.** (*S. eremophila* Bienert ex Boiss. Fl. Or. **1**, 594 (1867) ; *S. setacea* Viv. var. *viscida* Boiss. l.c. ; *S. affinis* Boiss. (1856) non Godr. (1854)).

Mesopotamia, *Aucher-Eloy* 477 (isosynotype of *S. setacea* var. *viscida* Boiss.) ; 8 km. E. of Shihatha, Karbala liwa, 70 m., sandy gypsaceous subdesert, sandy wadi beds, locally common, viscid, corolla pale yellow, 11.3.1947, *Gillett and Rawi* 6565 ; West of Railway between Ain Dibbs and Beiji, Mosul liwa, 250 m., dry steppe with *Poa bulbosa*, *Carex stenophylla* and *Stipa tortilis*, soil sandy, common, corolla cream, claw longer than calyx, more viscid than 7163, carpophore longer, 1.4.1947, *Gillett and*

Rawi 7164 ; Felluja Desert, these still in flower grew in a sheltered gypsum pit, on the face they were dwarf and dead, 14.7.1955, *Haines* W264.

Guest 5016, 5088 already cited as *S. eremophila* Bienert in "The Rustam Herbarium" belong to this species.

As Bornmüller p. 139 (1911) points out this species seems more than varietally distinct from *S. setacea* Viv., which is characterized by the stem, leaves and calyx not being viscid, and by acute calyx-teeth. *S. villosa* differs from our plant in having generally wider leaves, a calyx 12–25 mm. long and the lobes of the petal-lamina obovate each 3.5–4 mm. wide. There is a description of *S. villosa* by Burt and Lewis, who have examined the type specimen, in *Kew Bull.* 347 (1952).

The name *S. eremophila* Bienert has been used by Bornmüller l.c. and Nábelek, but there is some doubt as to its validity. Boissier *Fl. Or.* **1**, 594 (1867) gives it as a synonym of *S. setacea* Viv. var. *viscida* as "*S. eremophila* Bienert in Bunge pl. Pers. exs.", and cites a specimen of Bunge's from Kerman. As this specimen has not been seen, it is not known for certain whether it is a manuscript name or distributed with a printed description on the label. As none of Bunge's other Persian specimens at Kew has a printed description, it seems safe to assume that there is no printed description on this one and therefore the earliest publication of *S. eremophila* is in Boissier's *Flora Orientalis* ; this is not valid as it is in synonymy.

S. atocioides Boiss. (*S. atocion* Murr. *B. umbrosa* Bornm. in *Beih. Bot. Centralbl.* **28**, II, 140 : 1911).

In montis Kuh-Sefin reg. infer. supra pagum Schaklava (ditionis Erbil) in faucibus [Shaqlawā, Arbīl], 12–1400 m., 9.5.1893, *Bornmüller* 975 ; Sefin Dagh above Shaqlawa, Arbīl liwa, 1100–1400 m., limestone rocks, *Quercus* forest formation, frequent, this species seems characteristic of such places throughout N. Iraq, pink, viscid, 9.5.1947, *Gillett* 8092 ; Matina, Mosul liwa, 1500 m., mountain side, pink, 15.5.1947, *Rawi* 8717 ; Rabatki, Mosul liwa, on red marl in open pine forest at 2200 ft. and in open at 4100 ft. on limestone, 29.4.1951, *Mooney* 4300 ; Zawita Gorge, c. 950 m., limestone gorge, deep pink, occasional, 29.4.1956, *Emberger*, *Guest*, *Long*, *Schwan* and *Serkahia* 15361 ; Shaqlawa, 4000 ft., abundant in shady rocks, with *Geranium lucidum*, 12.5.1956, *Haines* W612.

Silene aucheriana Boiss.

Pir Omar Gudrun, July 1867, *Hausknecht* ; in montis Kuh-Sefin (ditionis Erbil) regione superiore, 1800 m., 21.5.1893, *Bornmüller* 979 ; Pir Omar Gudrun, Sulaimaniya liwa, 1200–1600 m., limestone mt. with coppiced *Quercus aegilops* forest, corolla white or nearly so, veins on calyx not conspicuous, 19.4.1947, *Gillett* 7769 ; do. above Qarachitan, 1200–1600 m., limestone mt. with coppiced *Quercus aegilops* forest, corolla pink, calyx conspicuously veined, 19.4.1947, *Gillett* 7770 ; Sefin Dagh above Arbīl, 1400 m., steep limestone mt. *Quercus* forest, calyx red-veined, viscid, petals cream or white, 9.5.1947, *Gillett* 8165 ; Matina, Mosul liwa, 2000 m., 15.5.1947, *Rawi* 8684 ; Khantur, Mosul liwa, 1800 m., 11.5.1947, *Rawi* 8789 ; Kodo near Haji Omran, 2500–2800 m., 22.6.1947, *Rawi* 9197, 9220 ; Pir Omar Gudrun, Sulaimaniya liwa, 2000 m.,

Astragalus-thorn-cushion zone, native name shinka, 7.6.1948, *Rawi* 12080; Helgord (Arl Gird Dag), 1800 m., on mountain, frequent, 1.7.1954, *Rawi* 13731.

There is considerable variation in the size of the plant and in the width of the leaves in this species, but there are intermediates between the variants and it seems unnecessary to give varietal names.

***Silene chlorifolia* Sm.**

Riwandous [Rowanduz], in m. Sakri-Sakran regione alpina, 2100 m., 24.6.1893, *Bornmüller* 984; valley between Gunda Shor and Darband, Arbil liwa, 1400 m., *Quercus libani-infectoria* forest on steep slopes, metamorphic rocks, open stony places, locally frequent, 60 cm. tall, corolla greenish cream, stem very viscid, 25.8.1948, *Gillett* 12401.

Bornmüller described his number 984 as *f. macrocalyx* p. 144 (1911). Its calyces are 30–35 mm. long. In *Gillett* 12401 the calyces are either immature or broken off so that it cannot be decided if it is the same form or not.

Distr. Cauc., Asia Minor, Lebanon, N. 'Iraq.

***Silene chlorifolia* Sm. var. *swertiifolia* Rohrb. Monogr. Gatt. *Silene* 177 (1868).**

Pir Omar Gudrun, June 1867, *Hausknecht*; in montis Kuh-Sefin reg. infer. supra pagum Schaklava (ditionis Erbil), [Shaqlawaw, Arbil], 1000 m., 20.5.1893, *Bornmüller* 983; Zakho Pass, 2500 ft., 25.5.1932, *Guest* 2283; Chia-i-Mandali, 6500 ft., stony ground in a cornfield, 20.7.1932, *Guest* 2741; Zawita Gorge, 3000 ft., on rocks, 26.7.1933, *Guest* 3713; Zawita, 3700 ft., in oak forest on steep rocky slope, 28.7.1933, *Guest* 4615; Jabal Baradost near Diana Rowanduz, 28.–29.6.1934, *Field and Lazar* 904; Sefin Dag above Shaqlawa, Arbil liwa, 1200–1400 m., steep limestone mountain with *Quercus* forest, petals greenish cream-brownish, calyx reddish, stem very viscid for 1 inch below leaves catching flies as large as houseflies, 9.5.1947, *Gillett* 8164; c. 12 km. E. of Chemchemical, Kirkuk liwa, 800 m., *Quercus aegilops* formation all trees destroyed, sandy rocky country, occasional, petals greenish, filaments purple, narrow viscid bands on pedicels, 3.6.1948, *Gillett* 11615; Jabal Avroman above Darimar, Sulaimaniya liwa, 1650 m., limestone mountain with coppiced *Quercus aegilops* forest, local, corolla white inside, greenish brown with crimson veins outside, filaments and style purple, opens by night closes in sun, short patches on pedicels and stem viscid, 8.6.1948, *Gillett* 11842; Rowanduz Gorge, c. 600 m., damp shady north cliff, 25.11.1954, *Guest and G. Long* 13614.

The European *S. longiflora* Ehrh. has less glaucous, narrower leaves three-nerved at the base and the basal leaves are grouped in rosettes. Var. *swertiifolia* Boiss. is possibly a hybrid swarm between var. *chlorifolia* and *S. longiflora* or some other narrow-leaved species. This would account for its variability in leaf-shape and other characters—*Guest* 2741 and *Gillett and Rawi* 11615 have narrower leaves and petal-laminas than the rest of the material seen from 'Iraq.

Guest 2741 I previously placed in *S. longiflora* Ehrh., but on re-examining it it, appears better in *S. swertiifolia* despite its narrower leaves, as its

leaves are markedly glaucous, one-nerved and there is no rosette of basal leaves at flowering time.

Turkish material has been seen which approaches fairly closely to the European *S. longiflora*.

***S. colorata* Poir. subsp. *oliveriana* (Otth) Rohrbach (*S. oliveriana* Otth).**

Near Rutba Wells, flower pink, Apr. 1933, *Dickson* XI ; Qal'a Shargat, 25.5.1934, *Field and Lazar* 407 ; Qaiyara, Mosul liwa, 640 ft., abundant round ants' nests and in depressions, wadis, etc., upright annual with pale pink flowers opening in the evening and then fragrant, corolla scales white, calyx green (5) with 10 reddish veins, 17.3.1939, *Bayliss* 35 ; 5 km. E. of As Salman, Southern desert, c. 200 m., subdesert, sandy wadi beds, locally common, cream or purplish, 24.2.1947, *Gillett and Rawi* 6199 ; Shabicha, Southern desert, 250 m., subdesert, sandy wadi beds, frequent, pale pink, calyx with red stripes, 25.2.1947, *Gillett and Rawi* 6255 ; Badra, Kut liwa, 100 m., dry steppe on stony hills, occasional, pinkish and white, 18.3.1947, *Gillett* 6625 ; Wadi Hauran—K3, Duleim liwa, 140 m., depression in dry steppe-subdesert, frequent, pink, 25.3.1947, *Gillett and Rawi* 6888 ; W. of railway between Ain Dibs and Beiji, Mosul liwa, 200 m., dry steppe, soil rather sandy with *Poa bulbosa*, *Carex stenophylla* and *Stipa tortilis*, frequent, corolla cream, the limb pale pink inside, claw hardly longer than calyx, opens only in evening, strong musky odour, 1.4.1947, *Gillett and Rawi* 7163 ; Hawija, Kirkuk liwa, 250 m., dry steppe, by roadside, occasional, corolla pale pink fading in the heat of the day, calyx red veined, 3.4.1948, *Gillett* 10701 ; Mosul, c. 250 m., field, pink flowers, 4.5.1954, *Guest* 13234 ; Jazira, between Beiji and Talail al-Nil, c. 350 m., open *Achillea* steppe pink, 11.5.1954, *Guest* 13427 ; Jarmo, Kirkuk liwa, wheat field, light purple or blue, 24.3. and 5.4.1955, *Helbaek* 454, 610.

Ravano in *Archivio Bot.* **13**, 261 (1937) and **15**, 189 (1939) deals with the variation in *S. colorata* Poir. On p. 215 (1939) he treats *S. oliveriana* as a variety of *S. colorata*. As the distribution of *S. oliveriana* is more limited than that of *S. colorata* s.l. subspecies seems a more suitable rank. The narrower leaves and the carpophore about as long as the capsule are the distinguishing features of this subspecies (see Burt and Lewis in *Kew Bull.* 343 : 1952).

Boissier p. 594 (1867) cites "in deserto Mesopotomiae ad Euphratem (Chesney exs. 123)" as *S. setacea* Viv. There are specimens under this number at Kew, which are not viscid and have seeds with a flat face and a winged back. These have been correctly identified by Rohrbach as *S. colorata* subsp. *oliveriana*.

***Silene commelinifolia* Boiss. in *Diagn. Ser.* 1, 1, 35 (1842) var. *commelinifolia*.**

In rupt. Pir Omar Gudrun, 6000 ft., June 1867, *Haussknecht* ; Avroman Dag above Darimar, Sulaimaniya liwa, 2200 m., limestone crags above tree limit, occasional, pink, 3.6.1948, *Gillett* 11871 ; Pir Omar Gudrun, Sulaimaniya liwa, 2000 m., native name narmoka, 7.6.1948, *Rawi* 12101.

The types are "Persiae monte Zerdkou et in Armenia. Aucher pl. exs. No. 442 et 4206". Both these numbers are represented at Kew. The

widest leaves are 5 mm. wide (*Aucher* 4206), and 7 mm. wide (*Aucher* 442). In some of the 'Iraq specimens cited above the leaves are up to 17 mm. wide, but it is most convenient to regard all the specimens with ovate or suborbicular stem-leaves as var. *commelinifolia*, and to give a different varietal name only to the very narrow-leaved specimens.

Distr. (of var. *commelinifolia*) Asia Minor, N. 'Iraq, N. Pers.

***Silene commelinifolia* Boiss. var. *eremicana* (Stapf) stat. nov.** (*S. eremicana* Stapf in Denkschr. Akad. Wien. **2**, 17 (1886)).

Chia-i-Mandali, 8000–9000 ft., on the rocky mountain side, 26.7.1932, *Guest* 2792.

The type of this variety is Persia : Mount Elwend near Haydere, 29.6.1882, *T. Pichler*. Var. *eremicana* is characterized by the very narrow leaves, the widest are only 2 mm. wide linear or linear-subulate, giving this variety at very different general appearance to var. *commelinifolia*, but the two varieties are connected by a series of intermediates—Persia, Mt. Elwend, 22.6.1882, *Pichler* (leaves up to 5 mm. wide) ; Persia, Mishou-Dagh, 12.7.1928, *Gilliat-Smith* 2386 (leaves up to 8 mm. wide) ; Persia, Mt. Schahu, July 1867, *Hausknecht* (leaves up to 10 mm. wide) ; 'Iraq, Pir Omar Gudrun, June 1867, *Hausknecht* (leaves up to 17 mm. wide) ; Persia, Elburs, Totschal, Scheheristanck, 3.4.1902, *Bornmüller* 6373 (leaves up to 26 mm. long).

The leaves show a gradation from linear to suborbicular in these specimens. In this species the stem-leaves are generally wider than the basal leaves, but this is least marked in the narrow-leaved specimens.

S. moorcroftiana Wall. and *S. subulata* Boiss. differ from *S. commelinifolia* in having obtuse calyx-teeth. *Guest* 2792 I erroneously identified as *S. subulata* in "The Rustam Herbarium" in Kew Bull. 402 (1948).

Distr. (of var. *eremicana*). N. 'Iraq, N. Pers.

***Silene dichotoma* Ehrh. Beitr. **7**, 143 (1792) s.l.** (*S. trinervis* Banks et Sol. 1794 ; *S. racemosa* Otth ex DC. Prod. **1**, 384 : 1824 ; *S. racemosa* Otth var. *sibthorpiana* (Rchb.) Boiss. Fl. Or. **1**, 589 : 1867).

Mesopotamia, *Aucher-Eloy* 475 ; Qosh Tapa (near Arbil), 405 m., native name shuwarah dhurah ?, 2.4.31, *Guest* 1480 ; Arbil, 375 m., in a cornfield on stony red loam, 20.7.33, *Guest* 2135 ; Shaikh Adi near Ain Sifni, 13.6.1934, *Field and Lazar* 699 ; Shaqlawa, Arbil liwa, 1000 m., stony overgrazed limestone slopes with relics of *Quercus* forest, occasional, cream, 8.5.1947, *Gillett* 8056 ; Sefin Dag, above Shaqlawa, Arbil liwa, 1350 m., steep limestone mountain, N. aspect, *Quercus* forest, white, 9.5.1947, *Gillett* 8163 ; Jabal Avroman, north of Biyara, Sulaimaniya liwa, 1700 m., limestone, coppiced *Quercus aegilops* forest, occasional, white, 7.6.1948, *Gillett* 11804 ; Salah ed Din, ridge of calcareous limestone between Arbil and Shaqlawa, 1080 m., well covered by vegetation grass, shrubs and trees, preserved by law of ten years standing, 12.4.1955, *Helbaek* 740.

There has been considerable confusion over the name and rank of this plant. *Aucher-Eloy* 475 is cited by Boissier p. 589 (1867) as *S. racemosa* Otth var. *sibthorpiana* (Rchb.) Boiss., which he describes as "similis

typo, sed corona ad basin laminae minima ad 2 squamulas vel gibbos reducta." *S. dichotoma* Ehrh. he regards as a separate species with a mainly European distribution distinguished by a longer calyx (12 mm. long) petal-lamina less deeply divided and an oblong capsule. *S. racemosa* Otth he describes as having a calyx 8–10 mm. long, petal-laminae more deeply divided and an ovate capsule; it is confined to the Orient. Turrill in Kew Bull. 309 (1939) keeps *S. racemosa* as a separate species and gives its distribution "sensu Boiss." These characters are not very satisfactory and other writers have suggested different ones—Velenovsky Fl. Bulgarica Suppl. 1, 36 (1898) gives an account of them. *S. racemosa* is reduced to a subspecies of *S. dichotoma* by Hayek Prod. Fl. Pens. Balcan. 1, 261 (1924) and by Rechinger f. Fl. Aegaea 166 (1943). Hayek recognizes subsp. *eu-dichotoma* as having the branches of the cincinni simple loose, many-flowered, the calyx becoming glabrous in fruit, upper bracts lanceolate acute glabrous, capsule as long as the calyx, while subsp. *racemosa* has cincinni repeatedly dichotomous, dense and few-flowered, upper bracts wide ovate acuminate ciliate, calyx long-hairy in fruit, capsule shorter than the calyx. Var. *sibthorpiana* he includes under the latter subspecies.

The earliest name for *S. racemosa* Otth as a species is *S. trinervis* Banks et Sol. (1794); as a subsp. of *S. dichotoma* Ehrh. its earliest name is subsp. *rumelica* Formanek in Verhand. Bot. Ver. Brunn 36, 99 (1867).

The Iraqi material cited above shows calyces 8–12 mm. long, hairy in fruit. The corona-scales are under 0.5 mm. long and vary from semi-circular to wider than long truncate with 2–3 very shallow teeth at the apex and to more or less triangular obtuse at apex. The petal-lamina is divided to below the middle. The capsule is ovate, shorter than the calyx. The bracts are more or less hairy and their shape rather variable. The flowers are laxly arranged in some specimens (e.g. *Field and Lazar* 699) and more densely in others (e.g. *Guest* 1480); this character seems to depend on the age of the plant.

In view of the rather inconstant nature of these characters, it seems advisable to include all the Iraqi material under *S. dichotoma* Ehrh. s.l. Forms with red petals, glabrescent forms and ecoronate forms have been recorded within the species (see Rohrbach Mongr. der Gatt. *Silene* 94 : 1868) but these have not so far been seen in 'Iraq.

Distr. (of species as a whole). E. and S.E. Europe, Cauc., As. Min., Cyprus, Syria, Pal., 'Iraq, N. Pers. (introduced in Great Britain, Centr. Europe).

***Silene eriocalycina* Boiss.**

Mesopotamia, *Aucher-Eloy* 461; Riwandous [Rowanduz] (ad fines Pers.) in m. Sakri-Sakran regione alpina, 2000 m., 23.6.1893, *Bornmüller* 980.

***Silene linearis* Decaisne** s.l. 1835 (*S. arenosa* C. Koch 1841; *S. chaetodonta* Boiss. 1842; *S. leyseroides* Boiss. 1842; *S. kotschyi* Boiss. 1842).

In deserto Babyloniae, *Aucher-Eloy* 448 (isotype of *S. leyseroides* Boiss.) ; in montis Kuh-Sefin reg. infer. ad pagum Schaklava (ditionis Erbil), 900 m., 6.6.1893, *Bornmüller* 971; Mesopotamia, *G. A. Watson*; near

Chaldaea, Sept. 1928, *Legrain* H1374 ; Rowanduz Gorge, 1800 ft., by a waterfall on rocky ground, 17.7.1932, *Guest* 3015 ; Greater Zab near Eski Kellek, Arbil liwa, 300 m., steep stony slopes, moist type steppe, very viscid stems, corolla pink, locally common, 11.5.1947, *Gillett* 8188 ; Jabal Mahmoud [Makhmur], Arbil liwa, 700 m., occasional, limestone mountain with *Pistacia* and *Prunus* and *Amygdalus spartioides*, occasional, stems viscid, corolla greenish yellow, 30.5.1948, *Gillett* 11235 ; Jabal Avroman, Biyara, Sulaimaniya liwa, 950 m., locally abundant, steep stony slopes, igneous or metamorphic rocks, among irrigated gardens, pink, native name nasrin, 6.6.1948, *Gillett* 11743 ; Felluja Desert, open surfaces, common, 16.4.1955, *Haines* W164 ; Jarmo, Kirkuk liwa, 2500 ft., abundant on dry earthy surfaces, 22.5.1955, *Haines* W378 ; Dohuk, dry rocky trodden slope at roadside, 29.7.1955, *Haines* W457 ; Jarmo, dry silt ridges, yellowish, 16.5.1955, *Helbaek* 1768 ; Jarmo, dry silt ridges, viscous bands, whitish, 21.5.1955, *Helbaek* 1826.

There is an account of this species by Burt and Lewis in *Kew Bull.* 345-6 (1952), where the related species regarded here as conspecific are treated tentatively as separate species. Further material has become available, since they wrote, and a lack of correlation between the characters used to distinguish these species is apparent. These characters are :—

(a). Flower-colour. *Gillett* 8188, 11743 have pink petals with oblong-ovate lobes of the lamina. *Helbaek* 1768, 1826 have similarly shaped lamina-lobes but the colour is whitish or yellowish. *Gillett* 11235 has distinctly narrower lamina-lobes but they are greenish-yellow.

(b). Petal-shape. *Haines* W164 has linear-oblong lamina-lobes which are a fair match for those figured (fig. 5c) by Burt and Lewis as *S. leyseroides*, while *Helbaek* 1768, 1826 and *Gillett* 8188, 11743 have oblong-ovate lamina-lobes. Intermediate shapes are shown in *Haines* W457, *Gillett* 11235 and *Bornmüller* 971.

(c). Corona. There is considerable variation in shape. In *Gillett* 8188 they are acuminate at the apex, in *Gillett* 11235 they are truncate with six small teeth at the apex, and in *Haines* W457 they vary in the one flower from acuminate to acute or subobtusely to acute and very slightly emarginate (bidenticulate) at the apex.

(d). Seed. Boissier p. 601 : 1867 distinguishes *S. linearis* Decne. and *S. leyseroides* Boiss. as "semina dorso canaliculata" as opposed to *S. chaetodonta* Boiss. "semina dorso planiuscula". *Gillett* 8188 has seeds distinctly canaliculate on the back although its corolla characters would place it in *S. chaetodonta* as defined by Boissier's description (p. 605). *Haines* W164 might be regarded as having seeds either canaliculate or more or less flat on the back, although the lamina-lobes are narrow. *Haines* W457 and *Guest* 3015 have shallowly canaliculate seeds.

There is also considerable variation in the height of the plant and in the width of the lower leaves.

***Silene longipetala* Vent. s.l.**

Tel el Shour between Tel Afar and Balad Sinjar, 1.6.1934, *Field and Youssef Lazar* 590 ; Matina, Mosul liwa, 1500 m., 15.5.1947, *Rawi* 8716 ;

Gweija Dagħ near Sulaimaniya, 1200 m., limestone mt. denuded of *Quercus aegilops* forest, 17.4.1947, Kurdish name sepulka, *Rawi* 8881A ; Kursi, Jabal Sinjar, 800–1000 m., limestone mt. with relics of *Quercus aegilops* forest and terraced fig gardens, frequent, viscid, corolla greenish cream, 24.5.1948, *Gillett* 11016 ; Haji Omran, Arbil liwa, 1750 m., *Astragalus*-thorn-cushion zone on igneous or metamorphic rock, 3.6.1948 *G. Chapman* 11941 ; Helgord [Arl Gird Dagħ], 1800 m., on mountain, frequent, 1.7.1954, *Rawi* 13731A.

Boissier **1**, 636 (1867) distinguishes *S. puberula* Boiss. from *S. longipetala* in possessing hairy calyces and edentule petal-claws. In *S. longipetala* he states that the calyces are glabrous and the petal-claws subbiauriculate. Much of the 'Iraq material cited above is intermediate between the two. The calyces are very sparsely hairy in *Rawi* 13731, and glabrescent rather than glabrous in the rest of the material from 'Iraq cited above. The petal-claw is edentule in *Guest* 4076 but subbiauriculate in *Rawi* 8881A, although there is no real difference in the calyx-indument ; this character appears to be too inconstant to be used. There is also considerable variation in the length of the petal-laminae.

***Silene longipetala* Vent. var. *puberula* (Boiss.) Blakelock stat. nov.** (*S. puberula* Boiss., Fl. Or. **1**, 636 : 1867).

According to Boissier Fl. Or. Suppl. p. 103 : 1888, this variety was collected by Haussknecht "in rupestribus calcareis montis Pir Omar Gudrun". No specimen at Kew from 'Iraq has as densely hairy a calyx as type-material of this variety (Armenia, near Baibout, 13.7.1861, *Bourgeau* 43). Rohrbach Monogr. *Silene* 76 (1868) includes both "*S. puberula*" and *S. longipetala* as "petala unguibus exauriculatis", despite Boissier's statement to the contrary.

***Silene muscipula* L.**

Anthony p. 283 (1935) records this from Jabal Sanam.

***Silene odontopetala* Fenzl s.l.**

Fissuris rupium calcareum m. Gara Kurdist innata, 1.8.1841, *Kotschy* 357 (B.M.) ; Chia-i-Mandali, 2500 m., on a cliff, 19.7.1932, *Guest* 2803 ; Arl Gird Dagħ, 3100 m., on rocky mountain side, flowers white-yellow, 22.7.1932, *Guest* 2859 ; same loc., pinkish flowers, *Guest* 2860 ; Gara Dagħ, 1700–1900 m., limestone mountain, white, 26.6.1947, *Rawi* 9273, 9286 ; Arl Gird Dagħ, 2900–3000 m., subalpine, igneous or metamorphic rock, calyx red, 5.8.1947, *Gillett* 9607 ; Sersang [Sarsing, Mosul liwa], 5000 ft., cracks in shady rocks above gorge, 14.7.55, *Haines* W483.

There is great variation within this species in size of plant, shape and size of the leaves and the amount of indumentum, but there seems relatively little correlation between these characters. The varieties which have been described tend to merge into each other, so that for the present it seems preferable to group all the 'Iraq material under *S. odontopetala* s.l.

Bornmüller records this species from Sakri-Sakran, E. of Rowanduz, 2200 m., *Bornmüller* 982 (p. 144 : 1911).

***Silene oreophila* Boiss.**

Penjwin, 1000 m., valley, white, native name glunca spia or chnaroka, 23.4.1947, *Rawi* 8810.

The leaves in this gathering are wider than in the isotype at Kew.

Distr. Asia Minor.

***Silene pruinosa* Boiss. ?**

Recorded by Anthony p. 283 (1935) from Jabal Sanam. As this locality is in Basra liwa in the south of 'Iraq and this species is otherwise known from Asia Minor and Persia there seems to be some doubt as to this identification.

S. pruinosa differs from *S. spergulifolia* (Willd.) M.B. in little more than a dense indumentum and is doubtfully distinct as a species.

***Silene rigidula* Sibth.**

Nábělek p. 46 (1923) cites a specimen as "distr. Serizor ad pagum Dêr Harîr inter Erbil [Arbil] et Rewandûz [Rowanduz], in declivitatibus aridissimis alt. ca. 650 m., 20.v.1910 (No. 4193)."

***Silene schizopetala* Bornm. e descr.**

Bakirma, Mosul liwa, 1200 m., 9.5.1947, *Rawi* 8575.

Bornmüller's type is cited (p. 144) as : "Im Gebirge östlich von Erbil (Kurdistan) : felsige schattige Abhänge des Kuh-i-Sefin, oberhalb Schaklawâ, bei 1600 m. (l.v.1893 : no. 951)." The long hairs on the stem up to c. 2 mm. long, distinguish *Rawi* 8575 from *S. fimbriata* M.B. (Cauc., As. Min.).

Distr. N. 'Iraq.

***Silene spergulifolia* (Willd.) M.B.** Fl. Taur. Cauc. **3**, 305 (1819) (*Cucubalus spergulifolius* Willd. Sp. Pl. **2**, 690 (1800), Desf. Coroll. Tourn. 73 (1808) ; *Silene stenobotrys* Boiss. et Haussk. Fl. Or. **1**, 611 (1867).

In rupestribus et lapidosis m. Gara Kurdistaniae, 25.7.1841, *Kotschy* 322 ; in cretaceo m. Singaræ, May 1867, *Haussknecht* (B.M.) ; Jabal Bekheir near Zakho, 15.-18.6.1934, *Field and Youssef Lazar* 777 ; Zawita, in oak forest on steep rocky slope, 3750 ft., 28.7.1933, *Guest* 4549 ; Zawita, 3000-4000 ft., 28.7.1933, *Guest* 4667 ; Zawita, 2750 ft., on steep rocky slope, 30.7.1933, *Guest* 4814 ; Matina, 1700 m., 15.5.1947, *Rawi* 8712.

S. stenobotrys was originally distinguished from *S. spergulifolia* as having hairy stamens, but this seems an inadequate character on which to maintain a species as it does not seem to be clearly correlated with any other characters.

***Silene stentoria* Fenzl**

Zohary p. 57 : 1950 records this from the Rowanduz area. The species is very close to *S. rhynchocarpa* and perhaps only a variety of it.

***Silene villosa* Forsk. s.l.**

Mesopotamia, "Jebel Samara" [Jabal Sanam ?] *Watson* ; Southern Desert, Al Ichrisi, 115 m., 35 km. E. by N. of Busaiya, rolling sandy

plain with low dunes and sand ridges, frequent, cream flowers, native name sulaija, 15.4.1955, *Guest and Rawi* 14186 ; Southern Desert, Al Umaighl, c. 30 km. S. of Tall Lahm, c. 75 m., sand dunes with outcrops of pink sandstone and white calcareous rock, cream, frequent, 30.3.1956, *Guest and Ibrahim Mahallal* 15305.

There are notes on this species by Burt and Lewis in *Kew Bull.* 346 (1952). In *Guest and Rawi* 14186 the inflorescence is partly dichotomous and the seeds are black with depressions on the lateral surfaces. These two characters are also shown in Jordan : Wadi Ram, 3000 ft., 14.4.1945, *P. H. Davis* 8929 and Arabia : Oman, Bareimi, 1937, *Maxwell-Darling* 454. In *Watson*, cited above and also in some Egyptian specimens (e.g. *Bromfield* 142) the inflorescence is partly dichotomous but the seeds are brownish with more or less flat lateral surfaces, so that there is no clear correlation between these two characters. The carpophore may be hairy or glabrous in this species.

Distr. Algeria, Egypt, Sinai, Arabia, S.W. Pers., Jordan.

***Spergula arvensis* L.**

Blatter in *Journ. Ind. Bot. Soc.* **11**, 33 (1932) cites a specimen from a cornfield near Makina Masus, near Basra, 1916-18, *H. Whitehead*. This species has five styles.

***Spergula fallax* (Lowe) E. H. L. Krause (*S. flaccida* Roxb. et Asch.).**

E. of As Salman, Southern desert, 200 m., sandy wadi bed, in shade of rocks, occasional, white, 24.2.1947, *Gillett and Rawi* 6219 ; Shabicha, Southern desert, 250 m., subdesert, sandy wadi bed, occasional, white, *do.* 6272 ; Abughreib, Baghdad liwa, 40 m., cultivated subdesert alluvium, common, white, 8.4.1947, *Gillett* 6540 ; Kut-Asiziya, Kut liwa, 30 m., alluvial mud, rather saline desert, petals white, leaves rather succulent, 21.3.1947, *Gillett* 6746.

There are notes on this species by Milne-Redhead in *Kew Bull.* 338 (1950), and Burt and Lewis in *Kew Bull.* 349 (1952). The three styles and 3-valved capsule distinguish it from other species of *Spergula*.

Distr. Egypt, Pal., Arab., S. Pers., Afghan., Baluch., Atlantic Is., N. Afr., Nubia, N.W. and Central India.

***Spergularia* Presl**

Notes on this genus will be published later.

***Stellaria* L.**

A. Leaves ovate, with long petioles *S. media* (L.) Vill.

A¹ Leaves lanceolate or linear-lanceolate, sessile

B. Sepals herbaceous, glandular, obtuse sometimes acute ; leaves flaccid

Lepyrodiclis holosteoides (C.A.M.) Fenzl

B¹ Sepals rigid, glabrous or crisply pubescent, acute ; leaves rigid

S. kotschyana Fenzl

***Stellaria kotschyana* Fenzl var. *glabra* Bornm.** in Beih. Bot. Centralbl. **28**, ii, 149 (1911) (*Lepyrodiclis paniculata* Stapf).

Pir Omar Gudrun, June 1867, *Haussknecht*; Riwandous (ad fines Pers.) in m. Sakri-Sakran regione alpina, 2200 m., 23.6.1893, *Bornmüller* 966 (type no. of var. *glabra*); Chia-i-Mandali, 2700 m., on a rocky cliff, 19.7.1932, *Guest and Ludlow-Hewitt* 2696; Arl Gird Dagh, 2550 m., on rocks, 24.7.1932, *Guest* 2934; N.E. slopes of Arl Gird Dagh, 2600 m., dry slopes, *Astragalus*-thorn-cushion zone on igneous or metamorphic rock, locally common, white, ovary apparently 4-valved, 5.8.1947, *Gillett* 9561; Zewiya, Pir Omar Gudrun, Sulaimaniya liwa, 1100–1500 m., valley, white, 6.6.1948, *Rawi* 11526; Penjwin, Sulaimaniya liwa, 1800 m., mountainside, common, white, vernacular name liska, 9.6.1948, *Rawi* 12257; Arl Gird Dagh, Arbil liwa, 3100 m., dry slopes, subalpine zone, white, capsule 4-valved seed 1 or 2, 24.8.1948, *Gillett* 12375.

Var. *glabra* Bornm. was originally described as “*planta tota glaberrima nec minute crispule pubescens.*”

Distr. (of var. *glabra*). N. 'Iraq, Pers., Afghan.

***Telephium* L.**

A. Leaves oblong-spathulate, narrowly elliptic or obovate, base cuneate, apex obtuse or subacute *T. imperati* L. var. *orientale*

A¹ Leaves linear-lanceolate, base cuneate, apex acute

T. oligospermum Steud.

Pax and Hoffmann in Pflanzenfam. **16c**, 313 (1934) place this genus in the Caryophyllaceae; Bentham and Hooker Genera Plantarum have it in the Ficoideae. There is a monograph of the genus by F. N. Williams in Journ. Bot. **44**, 289–304 (1906).

***Telephium imperati* L. var. *orientale* (Boiss.) Boiss.** Fl. Or. **1**, 754 (1867).

Handel-Mazzetti p. 147 (1912) records this from Jabal Sinjar above the town, 700–1300 m., no. 1477 as *T. orientale* Boiss.

The leaves are very variable in size and shape in this variety, but they are wider in proportion to their length than in *T. oligospermum*. As only one gathering from 'Iraq has been seen, no definite opinion can be given as to whether *T. oligospermum* is really a distinct species.

***Telephium oligospermum* Steud.**

In m. Gara Kurdist. locis lapidosis, 25.7.1811, *Kotschy* 320.

According to Boissier **1**, 754 (1867) this species has 6–10 seeds in a capsule, while *T. imperati* has 15–20.

Williams l.c. p. 303 cites a specimen from the “mouth of the River Euphrates, in the vilayet of Basrah”, *Chesney* 149, as *Telephium glandulosum* Bertol. The specimen under this number at Kew is a *Cleome* and agrees well with Bertoloni's description and figure (Misc. Bot. **1**, 18, t. 2, fig. 2: 1842).

Tunica pachygona C.A.M.

Jabal Khatchra near Balad Sinjar, 5.6.1934, *Field and Lazar* 646 ; Jarmo, Kirkuk liwa, dry silt ridges about camp, yellowish, 1.5.1955, *Helbaek* 1286 ; Jarmo, near Chemchemical, 2500 ft., open soil slopes, *Haines* W369.

Velezia rigida L.

Zewiya, Pir Omar Gudrun, Sulaimaniya liwa, 1800 m., mountain side, pink, Kurdish name gia darzi, 6.6.1948, *Rawi* 12057 ; Zab near Eski Kellek, Arbil liwa, 300 m., sand bank in river, moist steppe climate, pink, 11.5.1947, *Gillett* 8196 ; Jarmo, Kirkuk liwa, dry silt ridges, red, 16.5.1955, *Helbaek* 1767 ; Jarmo near Chemchemical, 3000 ft., lower dry slopes of mountain range, *Haines* W230.

Additions and corrections

Since Part II of "Notes on the Flora of 'Iraq with keys" was published a considerable number of specimens have become available due to active collecting in 'Iraq or have been recorded in the recent literature. A number of additions and corrections are therefore made here to the lists and keys previously published in the Kew Bulletin.

In "The Rustam Herbarium—part I", 1948.

- p. 377. Under **Delphinium cappadocicum** Boiss. for "2755" read "2757".
- p. 395. Under **Helianthemum ledifolium** (L.) Mill. for "2319" read "2319A".

In "Notes on the Flora of 'Iraq with keys—part I", 1954.

- p. 471. "*Delphinium macrostachyum* Boiss. et Huth" should read "*Delphinium macrostachyum* Boiss. ex Huth".
- p. 475. Insert "**Nigella sativa** L. var. **brachyloba** Boiss. Fl. Or. 1, 68 (1867).

This variety is recorded by Regel, Sulaimaniya, weed in field, May 1952, *Regel* 76 (in *Candollea* 15, 186 : 1956).

- p. 486. **Glaucium refractum** Nábělek e descr. et icon. insert "Near Tauq Bridge (Koch hill spur), c. 300 m., shady sandstone hills, occasional, flame orange petals, dark spot at base, 3.5.1956, *Guest* 15538."
- p. 488. Insert "**Papaver bipinnatum** C.A.M. (var. ?). Recorded by Shiriaev :—Qaara Depression north of Rutba, 4.5.1950, *Field* 71A (in *Papers Peab. Mus. Arch. Ethn. Harv. Univ.* 48, 73 : 1956)."
- p. 488. Under **Papaver bornmülleri** Fedde e descr. insert "Diana plain (near Rowanduz), c. 700 m., cultivated field, frequent, scarlet (with black spot at base of petal), 2.5.1956, *Emberger, Guest, Long, Schwan* and *S. Y. Serkahia* 15532".

- p. 492. Insert "**Hypecoum geslinii** Coss. et Kral.

Nukhaib, 250 m., sandy soil with gravel, flowers yellow, 13.3.1955, *Rawi* 14784, 14785.

In this species the filaments are scarcely dilated and are no wider than the anther. In Iraq material of *H. pendulum* L. the filaments are dilated and wider than the anther. *H. geslinii* is figured by Cosson Ill. Flor. Atlant. t. 7 and by Hutchinson in Kew Bull. 102 (1921).

In *Rawi* 14784 the fruits are up to 3 mm. wide."

In "Notes on the Flora of 'Iraq with keys—part II", 1956.

- p. 498. The genus *Farsetia* should be in the branch of the key "P. Grey with adpressed or silky hairs or plant greenish, hairs 2-4-fid" not under "P¹ Tomentose, hairs stellate \pm spreading".

- p. 503. Line 6 after "seeds 1-seriate" insert "(2-seriate in *Diploaxis harra*)".

- p. 507. Line 35 after "or with" insert "long".

- p. 522. **Alyssum parviflorum** Fisch. var. **hirsutum** (M.B.) Koch and **A. pseudocalycinum** Zohary should be transferred to p. 520.

- p. 525. Insert under **Biscutella ciliata** DC. var. **applanata** Mach.-Laur.

"Zawita Gorge, c. 950 m., rocky limestone hillside in pine forest, frequent, 29.4.1956, *Emberger, Guest, Long, Schwan* and *Serkahia* 15373; Dohuk Gorge, c. 500 m., limestone ledges on cliff, frequent, 30.4.1956, *do.* 15413; Rowanduz Gorge (Khalifan), c. 700, limestone, occasional, 1.5.1956, *do.* 15462. *B. didyma* L. is reduced to synonymy by Machatschki-Laurich (in Bot. Archiv. **13**, 1-115: 1926); being placed partly in *B. apula* L. and partly in *B. lyrata* L. Neither of these species appears to occur in 'Iraq".

- p. 525. Insert "**Biscutella ciliata** DC. var. ?

S. bank of Euphrates opposite Rawa, Duleim liwa, 150 m., dry steppe-subdesert, limestone cliffs, common, yellow, fruits glabrous, 28.3.1947, *Gillett & Rawi* 7054. This specimen has glabrous fruits, 11-12.5 mm. wide."

- p. 528. Insert "**Calepina irregularis** (Asso) Thell.

Amadia, 3400 ft., in damp places in fields in the valley, 26.3.1931, *Guest* 1218 [not 1228 as stated in Kew Bull. 385: 1948]; Amadia, 3400 ft., in cultivated fields damp situations, 27.3.1931, *Guest* 1253; Qaiyara, Mosul liwa, 640 ft., a damp place near course of a wadi which contains water most of the year, upright annual, leaves bright green, flowers white, 12.2.1939, *Bayliss* 11; Qarachitan near Pir Omar Gudrun, Sulaimaniya liwa, 900 m., limestone, denuded *Quercus* forest formation by stream, white, common, 18.4.1947, *Gillett* 7698; Nineveh Experimental Farm, 250 m., alluvium, steppe climate, white,

occasional, 22.3.1948, *Gillett and Rawi* 10367 ; Bastura Chai, Arbil liwa, 600 m., lower margin of *Quercus* forest, sandy alluvium by stream under *Vitex* bushes, white, abundant, 27.3.1947, *Gillett and Rawi* 10489 ; Jarmo, 3800 ft., edge of cornfield, late May 1955, *Haines* W360."

- p. 529. Line 23 for "*S. erubescens*" read "*Clastopus erubescens*".
- p. 530. Under **Coronopus squamatus** (*Forsk.*) *Asch.* insert "Baghdad, 8 km. along Hilla Road, damp depressions at roadsides, 27.2.1955, *Haines* W592".
- p. 532. Under **Eremobium aegyptiacum** (*Spreng.*) *Hochr.* insert "Southern Desert, Al Umaighir, 30 km. SSW. of Tall Lahm, c. 75 m., sand dunes (with outcrops of pink sandstone and white calcareous rock), abundant, deep mauve, 30.3.1956, *Guest and Ibrahim Mahallal* 15307 ; Southern Desert, 30 km. SSW. of Tall Lahm (near Ur), c. 70 m., low sand hill ranges, frequent, cream to mauve, 26.3.1956, *Guest and Ibrahim Mahallal* 15212B".
- p. 532. For "**Eruca sativa** . . . retrorse hairs" read "**Eruca sativa** Mill. Gard. Dict. ed. VIII (1768) ; Lam. Fl. Fr. 2, 496 (1778) ; *Brassica eruca* L. Sp. Pl. 667 (1753).

var. **sativa**

Baghdad, *Colville* ; Karada, in cultivated fields of cotton farm, wild in Mesopotamia and cult. in the Punjab, eaten, flowers white, petals veined, bud-tips cobwebby hairy, 17 and 23.1.1920, *Paranjpye* ; Baghdad, field at Rustam, 25.4.1933, *Yussef Lazar* 3892 ; 6 km. above Rawa, Duleim liwa, 140 m., irrigated cereal fields by river, pale yellow with violet veins, 27.3.1947, *Gillett & Rawi* 7020 ; Zafraniya, Baghdad liwa, 40 m., locally common, yellow fading white with black veins, differs from 10190 in fruits being glabrous, 10.3.1948, *Gillett* 10191.

There has been some confusion about the correct authority for this species. The name *Eruca sativa* appears in Hill's British Herbal 238 (1756) and in Garsault's Description Vertus et Usages. 2, 166 pl. 259 (1767). Both these are illegitimate as the two works do not consistently employ the Linnean system of binary nomenclature (see International Code of Botanical Nomenclature, Art. 70 (5) : 1956).

var. **eriocarpa** (*Boiss.*) *Post Flor. Syr. Pal. Sin.* 79 (1896).

Mesopotamia, *G. A. Watson* ; Karada, in cultivated fields in cotton farm, 3-4 ft. high, very branching, sepals closely imbricating glabrous, saccate glands prominent, petals yellow, claw as long as the sepals, deeply veined, beak as long as or longer than the ovary, 21.1.1920, *Paranjpye* ; Jabal Hamrin, 150 m., Apr. 1931, *Ludlow-Hewitt* 1547 ; Jabal Qizil Robat, 150 m., on stony hillside, 29.3.1932, *Guest* 1816A ; Jabal Hamrin (nr. Table Mt.), 150 m., on dry rocky ledges on sandy soil, 28.3.1932, *Guest* 1817 ; Jabal

Hamrin, where crossed by Baquba-Khanaqin road, 150 m., sandy gypsaceous hills, dry steppe-subdesert, in wadi bed, frequent, pale yellow with black veins, 11.4.1947, *Gillett & Rawi* 7316 ; Zafraniya, Baghdad liwa, 40 m., irrigated subdesert, corolla yellow fading white, black-veined, calyx red, fruit hairy, much visited by bees locally abundant, this is very likely descended from Indian seed grown near here experimentally, c. 1930, it is said only to have appeared recently as a weed, 10.3.1948, *Gillett* 10190 ; 25 km. South of Kirkuk, Kirkuk liwa, 300 m., dry steppe, white eroded silt with pebbles, common, pale yellow with black veins, 20.3.1948 *Gillett & Rawi* 10333 ; Jabal Hamrin, foothills, 6.3.1955, *Haines* W316.

Var. *eriocarpa* differs from var. *sativa* in having the valves of the silique covered by retrorse hairs. In several specimens (e.g. *Gillett* 10190, *Ludlow-Hewitt* 1547, *Guest* 1816A) these hairs are extremely sparse, so that it is difficult to say whether they should be included in var. *eriocarpa* or not. There is also considerable variation in size of the plant, amount of branching, size of leaves, flowers and fruit, but there is little correlation between these characters ; possibly the species is represented in 'Iraq by forms or varieties which have escaped from cultivation as well as by wild plants. It is noticeable that European material of this species often shows rather larger fruits than the 'Iraq material."

p. 537. After **E. oleifolium** J. Gay ? insert

" **Erysimum** sp.

Jazira (about 100 km. N. of Ramadi), c. 80 m., rather sandy " haswa " plain, young flowers yellow, turning salmon pink, 20.2.1955, *Guest and Rawi* 13665.

The older flowers appear purple when dried. Except for a few teeth on the margin of the lower leaves, this specimen is a fairly good match for *Schafli* 12 cited on p. 537 as *E. oleifolium* J. Gay ? 13665 may be *E. purpureum* Auch. but it seems better not to give a definite name to either of these specimens until fruiting material is available and the possible range of leaf-variation in 'Iraq is better known. The petal-colour is different from any of the 'Iraq species with " at least some of the leaves dentate " in the key on p. 535. *Schafli* 12 and *Guest and Rawi* 13665 are apparently perennial or biennial."

p. 539. Under **Farsetia aegyptia** insert

" 50 km. N. of As-Salman, 180 m., stony plain, frequent, 17.3.1955, *Rawi* 14866 ; 25 km. S.E. of As-Salman, 180 m., stony plain, rare, 18.3.1955, *Rawi* 14886 ; 50 km. N. of As-Salman, 180 m., stony plain, frequent, 17.3.1955, *Rawi* 14873. 14873 shows the characteristic fruit of this species. It seems reasonable to assume that the remainder of the material from 'Iraq which bears flowers but no fruit represents the same species."

- p. 541. **Graellsia saxifragifolia** (DC.) Boiss. insert

"There is a monograph of this genus by Barbara A. Poulter in Notes R. Bot. of Gard. Edinb. **22**, 85-93 (1956). The specimens from 'Iraq (Gillett 11884, Gillett 7295) are described as *G. saxifragifolia* subsp. *longistyla* Poulter with a style 0.75-1.5 mm. long. Subsp. *saxifragifolia*, which is not recorded from 'Iraq, is described as having a style 0.3-0.5 mm. long.

The specimen figured in Kew Bull. fig. II, 20, p. 514 (1956) is from S.E. Persia : Kerman, Kuh Lalesar, 3800 m., 17.7. 1892, Bornmüller 2201b, as no ripe fruits from 'Iraq had been seen".

- p. 545. Under **Lepidium latifolium** L. insert

"Helgord [Arl Gird Dag], 1700 m., on slope, common, flowers white, used as fodder, native name alo, 17.1.1954, Rawi 13799 ; Sersang [Sarsing, Mosul liwa], 3500 ft., stony ground, 6.7.1955, Haines W501."

- p. 545. Last line for "*Laxar*" read "*Lazar*".

- p. 548. Under **Myagrurn perfoliatum** L. insert

"Shaqalawa, 2800 ft., several on a neglected much grazed field in village, also one found outside village at roadside edge of cornfield, Haines W377."

- p. 551. Insert "**Savignya parviflora** (Del.) Webb

Mesopotamia, "Jebel Samara" [Jabal Sanam], Watson ; near Chaldaea, Sept. 1928, Legrain 8 ; Shaiba near Basra, 6.1.1929, Rogers 005 ; Southern Desert (between Zubair and Jaliba), on high very sandy soil, strewn with small pebbles on surface, in *Haloxylon* association, 8.4.1933, Guest, Eig and Zohary 5060 ; Rustam Farm, near Baghdad, Apr. 1933, Yussef Lazar 47 ; 5 km. east of As Salman, Southern Desert, 200 m., sub-desert sandy stony ground, locally abundant, white, native name galgalan, 24.2.1947, Gillett & Rawi 6197 ; same locality, subdesert stony eluvium, occasional, 24.2.1947, Gillett & Rawi 6226 ; Karbala-Shithatha crest of escarpment Karbala liwa, 100 m., sandy gypsaceous subdesert, frequent, white, pod flattened but not very thin, 9.3.1947, Gillett & Rawi 6401 ; 10 km. east of Felluja, Baghdad liwa, 50 m., gravelly sub-desert with *Prosopis*, *Alhagi*, *Astragalus*, frequent, white, 23.3. 1947, Gillett & Rawi 6748 ; Felluja, c. 50 m., sandy hollows on Syrian desert escarpment, pale mauve flowers, 3.4.1953, Guest 12916 ; Felluja, c. 30 m., "haswa" (sandy gravel plain), whitish flowers, 14.3.1954, Guest 13174 ; 18 km. S. of Rutba, 640 m., plain, clay soil, frequent, flowers mauve-pink, 10.3. 1955, Rawi 14610 ; between Abu Ghraib and Felluja, 40 m., "haswa" sandy soil gypsaceous underneath, frequent, 24.2. 1955, Rawi 15113 ; 30 km. SSW. Tall Lahm near Ur, c. 70 m., low sand hill ranges, occasional, pale pink, Guest and Ibrahim Mahallal 15211A."

- p. 553. Line 1 for " outer petals " read " outer sepals ".
- p. 553. Under **Sisymbrium altissimum** L. for " *Guest* 522 " read " *Guest* 529 ".
- p. 554. Line 25 for " acuate " read " arcuate ".
- p. 558. Under **Cleome quinquenervia** DC. insert
 " Mosul (near Hamam Ali), 150 m., on dry grassy hills above the river, aromatic herb, 28.8.1953, *Guest* 13142 ".

- p. 560. Under **Reseda arabica** Boiss. insert
 " Southern Desert, about 45 km. S.E. by E. of Busaiya, c. 150 m., rather sandy " haswa " (gravel) plain, abundant, white petals, bright orange stamens, fruit green turning orange-brown, 16.4.1955, *Guest and Rawi* 14251, 14251A ; Southern Desert, 60 km. SW. by W. of Zubair, c. 70 m., sandy " haswa " (gravel plain), bright orange stamens, frequent, 16.4.1955, *Guest and Rawi* 14305 ; Jabal Sanam (Basra-Kuwait border), 100-150 m., volcanic rocky slopes with sandy places, occasional, 17.4.1955, *Guest, Rawi and Schwann* 14384.

These specimens show fruits ; 14251 has 4-dentate and 3-dentate capsules on the same plant. The pendulous subglobose capsules and the leaf shape distinguish *R. arabica* from *R. decursiva* and *R. luteola*, both of which have generally erect or erect-spreading capsules".

- p. 562. At end of Resedaceae insert

" **Reseda muricata** Presl

Near Ukhaidhir (about 50 km. WSW. of Karbala), c. 60 m. hard gravel plain (" haswa ") with gypsum, 12.4.1955, *Guest, Rawi and Long* 14013 ; Salman, Southern Desert, 200 m., hard silty soil in neighbourhood of well, erect, 14.4.1955, *Guest, Rawi and Long* 14095 ; same loc. and habitat, semi-prostrate form, *do.* 14096 ; Southern Desert, Khasm Ibn Hallag, 45 km. SW. of Busaiya, c. 215 m., compact sandy loam, rusty white, occasional, 29.3.1956, *Guest and Ibrahim Mahallal* 15274 ; Southern Desert, 21 km. S.S.W. of Busaiya, c. 180 m. barren plain, hard unkind silty soil, occasional, cream tinged rust, native name dhanabnab, 29.3.1956, *Guest and Ibrahim Mahallal* 15296.

14012, 14095 and 14096 show mature fruits. In 15274 and 15296 the fruits are immature, but would probably be subglobose on reaching maturity."

- p. 562. At end of Cistaceae insert

" **Helianthemum kahiricum** Del.

Jabal Sanam (Basra-Kuwait border), 100-150 m., volcanic rocky ridge at top of hill, frequent, erect shrublet, yellow flowers, 17.4.1955, *Guest, Rawi and Schwan* 14380.

In the key to **Helianthemum** Mill. and **Fumana** Spach p. 562 this would run down to *Fumana arabica*. The two species can be distinguished thus :—

Twigs whitish tomentose with a few longer spreading hairs not glandular ; outer sepals acute to obtuse, 4–7 mm. long
H. kahiricum Del.

Twigs glandular pubescent, not whitish ; outer sepals in fruit somewhat acuminate, 7–9 mm. (rarely 5–10 mm.) long
Fumana arabica (L.) Spach

Distr. Pal., Jordan, Sinai, Arabia, Egypt, Cyrenaica, Tunisia, Algeria, Morocco.”

p. 563. Under *Viola pachyrrhiza* for “ 1843 ” read “ 1841 ”.

p. 564. Under **Frankenia pulverulenta** L. for “ Sakhlawizal Canal . . Guest ” read “ Sakhlawiya Canal . . . S. Tiwary 327A ”.

Elementary Botany for Students in Tropical Countries.* —There can be no doubt that the future development of botany will largely depend on the extent to which the subject arouses interest in self-governing countries in the tropics, and the efficiency with which it is taught in schools and universities in those regions. Great responsibility therefore rests on those who give the instruction and write the text-books that will be used. Much of the elementary teaching of botany in tropical countries has, in the past, been based on courses designed for students in the Temperate part of the Northern Hemisphere. Mr. A. C. Dutta's “ Class-book of Botany ” is particularly interesting in this connection because its main framework is still based on the type of instruction that is given in Europe, but modified so that most of the plants mentioned in the text occur, or are cultivated, on the Indian sub-continent. The book is comprehensive in the sense that it covers all branches of botany from cytology and physiology to taxonomy and ecology, and deals with the morphology and life histories of selected representatives of all of the major groups in the plant kingdom. Specialists could, no doubt, here and there find points to criticize in their respective fields of study, and the text includes a certain number of over-simplified generalizations. The subject matter is, however, well balanced, and the book itself well produced and fully and clearly illustrated. The fact that it is the tenth edition of the book that is now under review indicates that it is already widely used amongst students of the type for whom it is intended.

C. R. METCALFE.

* Dutta, A. C. A Class-book of Botany. Pp. vi + 567. 10th edition. Oxford University Press, 1957. 17/6 net.

TWO NEW GENTIANAS FROM EASTERN N. GUINEA.

H. SMITH, UPSALA.

Gentiana juniperina *H. Smith* nov. sp. e sect. *Chondrophylla*.

Planta 7–13 cm. alta, basali parte radicante perennans. Caulis erectus, glaber, e basi et etiam superiore pauciramosus. Folia rigida, nitentia, stricte suberecta, acuminato-acicularia, 12–13-juga, internodiis subaequilonga vel vulgo longiora.—Ex affinitate *Gentianae macgregorii* Hemsley, a qua i. a. distat foliis minus aggregatis, a basi acuminatis, longius aristulatis et tota planta majore, magis elongata.

Folia caulina concavo-triquetra, apicem versus fere trigona 0.5 mm. longe aristulata, e basi 1.6–2 mm. lato acuminata, 7–11 mm. longa, costa dorsali cartilagineo-elevata ut marginibus anguste pellucido-cartilagineis cellulis calciferis instructa, marginibus praecipue deorsum obscure ciliolata; folia rosularia, si adsunt, quam caulina latiora et minus acuminata. Flores singuli, coerulei, 14–17 mm. longa; calycis tubus 6–7 mm. longus, lobi 6 mm. longi a basi acuminati, costa dorsali elevata, marginibus hyalino-alatis, apice aristulato modice incurvante, membrana intercalycina libera basin loborum superante; corollae tubus calycem paullo superans, lobi ovato-triangulares, apiculati, ca. 3.5 mm. longi et lati, plicae rotundato-triangulares, lobis duplo breviores, 3 mm. latae, subintegrae; stamina tubo 6 mm. alte adnata, filamentis liberis 3.5 mm. longis, thecis 2.5 mm. longis et 1 mm. crassis; ovarium stipitatum in anthesi ca. 7 mm. longum, stylo subnullo stigmatibus linearibus 1.3 mm. longis; capsula matura modice protrudens, apice anguste alata; semina angulari-elliptica, 0.7×0.35 mm. magna, testa brunnea obscure striatula.—Fig. 1.

EAST N. GUINEA: Mt. Simpson, 9500 ft., 28.10.1947 leg. N. C. G. Cruttwell no. 57 (Typus in herb. Kew.—“Small herb 2–4 inches, tufted habit with bright blue flowers. Leaves mucronate, shining. Bare peaty ground, where water seeps out not far below summit”).

Gentiana cruttwellii *H. Smith*, nov. sp. e sect. *Chondrophylla*.

Planta annua (?) *Gentianae ettingshausenii* F. Muell. subsimilis, sed distat: caule minus papilloso, foliis minoribus, vix coriaceis nec cellulis calciferis instructis, non cartilagineo-marginatis nec -costatis. Calycis lobis tubo duplo brevioribus, distantibus (nec basi latere tegentibus), non hyalino-marginatis, modice et tenuiter aristulatis.

Caulis gracilis ad 15 cm. longus suberectus, infra vaginas modice papillosus ceterum glabrescens, graciliter pauciramosus, ramis 1–4 cm. longis, unifloris. Folia rosularia non visa, caulina 15–20-juga internodiis breviora vel longiora, infima subpetiolata, ovata, acuta, 3–4 mm. longa et 2.5 mm. lata, superiora accrescentia, ad 5 mm. longa et 3 mm. lata, lanceolato-ovata, modice carinata, hyalino-marginata, margine obsolete microlacerata, apice acuto mucronulato vel in foliis supremis tenuiter aristulato. Flores ca. 14 mm. longi, coerulaei; calycis tubus 4–5 mm. longus, lobi 2–2.5 mm. longi e basi 0.8 mm. lato acuminati, breviter aristulati, modice carinati, membrana intercalycina libera, basin loborum paullo superante; corollae tubus 11 mm. longus, ore (in sicco) 4 mm. diam., lobi late triangulati-ovati, acuti, non mucronulati, ca. 2.2 mm.

longi et 2.5 mm. lati, plicae late ovatae, subintegrae; stamina tubo 5 mm. alte adnata, filamentis liberis 2.5 mm. longis, antheris 1.5 mm. longis et 0.7 mm. crassis; ovarium stipitatum in anthesi 3.5 mm. longum, stylo subnullo, stigmatibus linearibus 1.5 mm. longis.—Capsula, semina non visa.—Fig. 2.

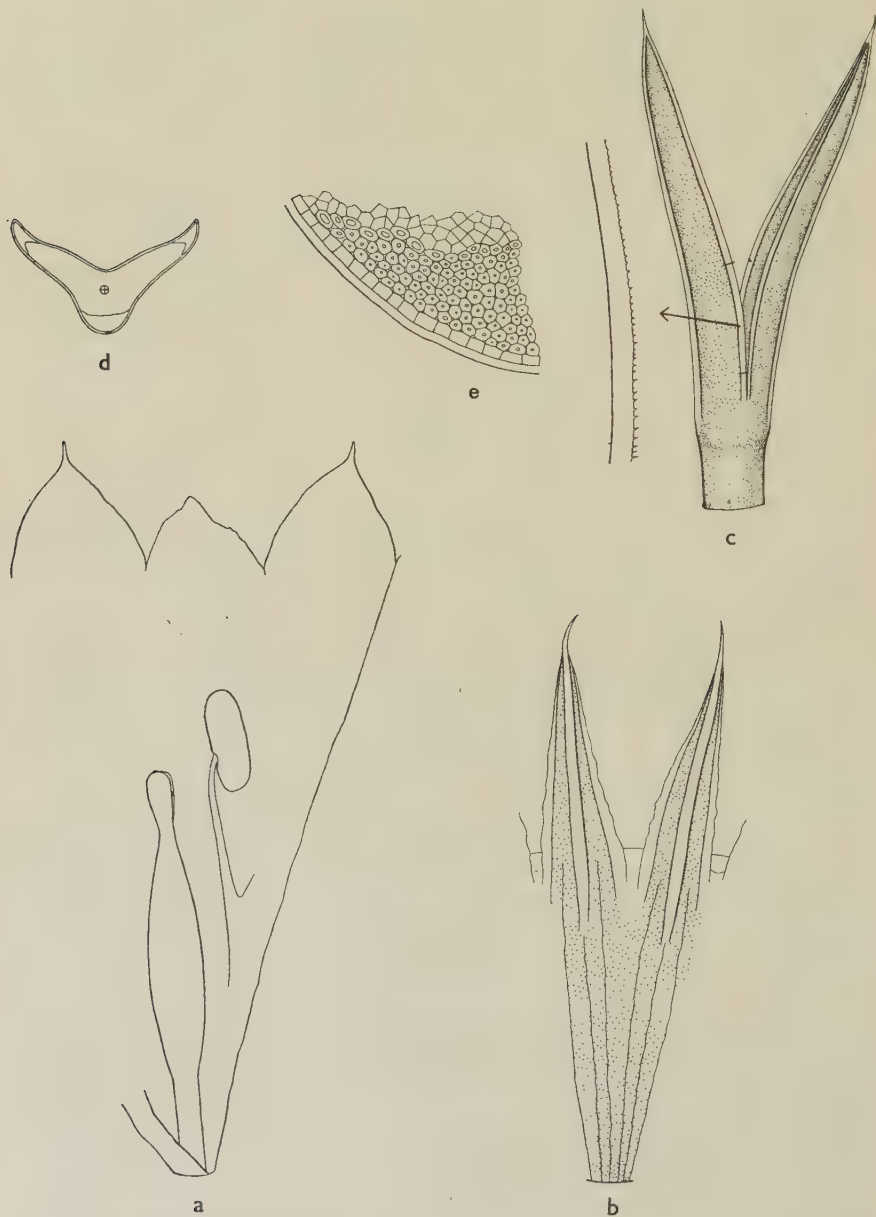


FIG. 1. *Gentiana juniperina* n. sp. : a section of flower; b : section of calyx; c : pair of median leaves and part of leaf margin in $15\times$; d : cross-section of upper part of leaf showing the glassy calciferous cell-layers at the margins and in the carina ($15\times$); e : part of carina showing epidermis, calciferous cells and parenchyma, $150\times$. a, b and c $5\times$.

EAST N. GUINEA : Mt. Simpson, 9500 ft., 28.10.1947 leg. N. C. G. Cruttwell no. 56 (Typus in herb. Kew. "Small herb slightly decumbent 3-6 inches with bright blue flowers. Leaves and stems tinged purple, leaves ovate-triangular, mucronate").

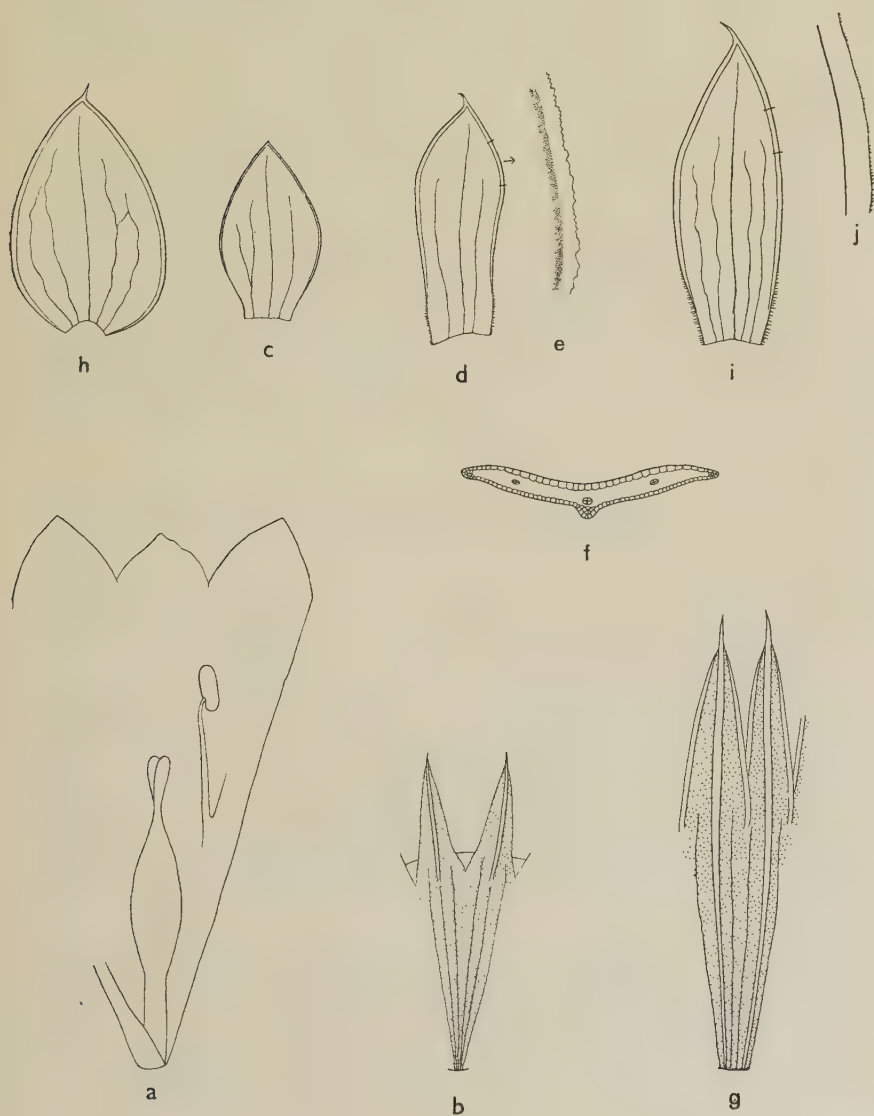


FIG. 2. *Gentiana cruttwellii* n. sp. : a : section of flower ; b : section of calyx ; c : lower and d upper leaf ; e : hyaline microlacinate border of upper leaf (15 \times) ; f : cross-section of leaf.—*Gentiana ettingshausenii* F. Muell. : g : section of calyx ; h : lower and i upper leaf ; j : cartilaginous micropapillate border of upper leaf (15 \times). If not otherwise stated 5 \times .

A NEW COMBINATION IN EPHIPPIANDRA AND A NEW SPECIES OF TAMBOURISSA (MONIMIACEAE).

A. CAVACO (Paris)

The preparation of *Monimiaceae* for the Flora of Madagascar and Comores revealed that *Tambourissa microphylla* Perk. (Engl. Pflanzenr. Monimiac. nachtr. 41 : 1911) belongs to *Ehippiandra* Decne. because the fruiting carpels are enveloped by a cupule and separated in fruit. Through the kindness of Dr. George Taylor, I was able to see the type of *Tambourissa microphylla* Perk. collected by Dr. Forsyth Major in Madagascar.

***Ehippiandra microphylla* (Perk.) Cavaco, comb. nov.**

Tambourissa microphylla Perk. in Pflanzenr. Monimiac. nachtr. 41 (1911).

MADAGASCAR. Without precise locality, recd. 1896, *Forsyth Major* 326 (*typus*, K.). District d'Ambatondrazaka, alt. 700 m., recd. Nov. 1938, *Cours* 1131 (P).

Since the revision of *Tambourissa* Sonn. in the Pflanzenreich, the only new species described is *T. thouvenotii* P. Danguy (Bull. Mus. Nat. Hist. Nat. Paris **28**, 250 : 1922). In the present paper I describe another new species based on a specimen in the herbarium of the Royal Botanic Gardens, Kew, which was collected by Dr. Kirk at Johanna Island in the Comoros.

***Tambourissa kirkii* Cavaco, sp. nov.**

Arbor ; rami adulti glabri. *Folia* ovato- vel elliptico-oblonga, 10–13.5 cm. longa, 6–7 cm. lata, petiolata, petiolo glabro 1–1.5 cm. longo, basi late cuneata vel obtusa, apice breviter acuminata, integra, papyracea, utrinque glabra, nervis prominentibus, venis parum conspicuis, nervis lateralibus circiter 7. *Inflorescentiae* ♀ cymosae, 3 cm. longae, pauciflorae (3–4-florae), pedunculo circa 2 cm. longo piloso, pedicellis 1 cm. longis pilosis ; receptaculum depresso-globosum, puberulum vel tomentosum, ore late aperto ; tepalis omnino nullis ; carpella numerosissima, dense conferta, in receptaculum carnosum basi immersa, stylis manifeste exsertis. *Flores* masculi et *fructus* non visi.

COMOROS. Johanna Island, without precise locality, alt. 1000 feet, *Kirk* s.n. (*typus*, K.).

This species is remarkable for the inflorescence-shape and for the large opening at the mouth of the female perianth, unlike those of any other species.

Tambourissa kirkii Cavaco has affinity with *T. leptophylla* (Tul.) A.DC., from the Comoros and Madagascar, especially in the appearance of the female flowers and in the leaf-shape. It differs from *T. leptophylla* principally by its shorter and looser inflorescence and its hairy peduncles, pedicels and perianth, which give it a quite distinct appearance.

NOTES ON AFRICAN ROSACEAE : I.

R. A. GRAHAM

1. Status Novi in Parinari.*

Parinari polyandra Benth. in Hook. f. & Benth., Fl. Nigrit : 333 (1849). Type : *Vogel* s.n. (K, holo.!).

ssp. 1 **polyandra**

ssp. 2 **floribunda** (Baker) R. Grah. stat. nov. Type : *Whyte* s.n. (K, holo.!).

P. floribunda Baker in K.B. 1897 : 265 (1897). Type as for ssp.

P. bequaertii De Wild. in Fedde, Rep. 13 : 108 (1914). Type : *Bequaert* s.n. (BR, holo.).

Ssp. *floribunda* differs from *P. bequaertii* in having leaves and—for the most part—inflorescences that are glabrous. In other characters they appear to be similar, and separation is not warranted. There is also a considerable resemblance between ssp. *polyandra* and ssp. *floribunda* but the flowers of the former seem in their component parts to be relatively smaller. Ssp. *polyandra* has a different range, being a tree of the Gold Coast–Nigeria region across to Sudan where ssp. *floribunda* does not seem to occur ; nor does ssp. *polyandra* appear to extend southwards into the range of ssp. *floribunda*.

P. curatellifolia Planch. ex Benth. in Hook. f. & Benth., Fl. Nigrit. 333 (1849). Types : *Heudelot* 362 ; *Vogel* 177 (K, syns.!).

Ssp. 1 **curatellifolia**

Ssp. 2 **mobola** (Oliv.) R. Grah. stat. nov. Type : *Welwitsch* 1282 (K, lecto.!).

P. mobola Oliv. in F.T.A. 2 : 368 (1871). Type as for ssp.

Although the two spp. appear clearly distinguishable when extremes are handled, there are so many intermediates—which occur not only in Tanganyika where the two overlap—in such characters as size of tree, development of crown, colour of indumentum, size of flowers and reproductive organs, number of primary nerves on the leaves, etc., that a specific separation is scarcely justifiable : indeed, barren material is often indeterminable as one or the other.

P. excelsa Sabine in Trans. Hort. Soc. 5 : 451 (1824). Type : Sierra Leone, *Don*, s.n. (K, lecto.!).

ssp. 1 **excelsa**

ssp. 2 **holstii** (Engl.) R. Grah., stat. nov.

P. holstii Engl., Pfl. Öst-Afr. C : 423, 191 (1895).

Type : Tanganyika, *Holst* 2425 (K, islecto.!).

*Throughout this section specific epithets first published in combination with *Parinarium* Juss. are transferred to *Parinari* without framing new combinations.

- P. mildbraedii* Engl. in Mildbr., Wiss. Erg. Deutsch. Zentr.-Afr. Exp. 1907-8, 2 : 227. (1911). Type : Ruanda-Urundi, Engler 1036 (B, holo. ‡).
- P. excelsa* var. *fulvescens* Engl., l.c. 227 (1911). Type : Engler 3232 [B, lecto. ‡ ; BR, (fragment) isolecto. !].
- P. nalaensis* De Wild., Pl. Bequaert 5 : 289 (1931). Type : Boone 46 (BR, holo.).
- P. excelsa* of Brenan, Tang. Terr. Check List 476 (1949) ; of Fl. West Trop. Afr. ed. 2, 1 (2) : 429 (1957) in part, non Sabine.
- P. holstii* var. *longifolia* Engl. ex De Wild & Th. Dur. in Ann. Mus. Congo Belge Bot., Sér. 3, 1 : 81 (1901). Type : Belgian Congo, Lokandou, Dewèvre 1109 C (BR, holo. !).
- P. capensis*** Harv. in Harv. & Sond., Fl. Cap. 2 : 597 (1862). Types : Zeyher 537 ; Burke 518 (K, syn. !).
- ssp. 1 ***capensis***
- ssp. 2 ***latifolia*** (Oliv.) R. Grah., stat. nov. Type : Welwitsch 1286 (K, iso. !).
- P. capensis* Harv. var. *latifolia* Oliv. in F.T.A. 2 : 369 (1871). Type : as for ssp.
- P. curatellifolia* Planch. ex Benth. var. *fruticulosa* R. E. Fr., Schwed. Rhod.-Kongo-Exp. 1 : 60 (1914). Types : Fries 646a ; 659 (U, syn.).
- P. pumila* Mildbr., Wiss. Erg. Zw. Deutsch. Zent.-Afr.-Exp. 1910-11, 2 : 4 (1922). Type : ? as for ssp. *latifolia*.
- P. latifolia* (Oliv.) Exell in J.B. Suppl. 1926-33 : 160. Type : Welwitsch 1285 (BM, holo. !).

Ssp. *latifolia* is a dwarf shrub which has a strong resemblance in leaf characters to *P. curatellifolia*, but the latter is a tree. The distinction from ssp. *capensis* is in the leaf shape—in the latter the leaves being typically narrower and the shoots even shorter. But both forms of leaf can occur in the same individual, and the taller growth in ssp. *latifolia* is apparently due to lack of burning. In South Africa, ssp. *capensis* is the normal form, while ssp. *latifolia* ranges, with intermediates, from French and Belgian Congo, and Angola eastwards to N. Rhodesia and Mozambique. The floral distinctions offered by Hauman [B.J.B.B. 21 : 194 (1951)] do not seem to be wholly reliable.

2. A New Combination in *Magnistipula*.

- Magnistipula bangweolensis*** (R. E. Fr.) R. Grah., comb. nov. Type : N.-E. Rhodesia, Mano river, Fries 732 (K, isolecto. !).
- Parinari bangweolensis* R.E. Fr. in Fedde, Rep. 12 : 540 (1913).
- Hirtella bangweolensis* (R.E. Fr.) Greenway in K.B. 199 (1928).

3. A New Species of *Hirtella* from Tanganyika.

H. megacarpa R. Grah. sp. nov. quamquam flores haud satis noti ab *H. zanzibarica* Oliv. ut videtur foliis minoribus angustioribus minus nitidis, nervis prominentius reticulatis et fructibus majoribus, valde distincta. Typus : W. Usambaras, Shagai Forest, near Sungu, May 1953, Drummond & Hemsley 2614 (K, holo.!).

Arbor ad 20 m. (? vel ultra) alta. *Ramuli* foliosi pilis \pm aureis patentibus pubescentes. *Folia* subcoriacea, breviter petiolata, oblongo-elliptica, ad 8.0×2.8 cm. sed longitudine latitudinem plerumque ter superante apice acuminata vel caudato-acuminata \pm obtusa, basi breviter angustata vel rotundata supra praeter costam pubescentem glabra haud vel levissime nitida, subtus costa pubescente nervis reticulatis prominentibus aucta. *Petoli* 2–5 mm. longi rugulosi pubescentes. *Inflorescentia* ignota : florem unicum imperfectum tantum vidi. *Petala*, *ovarium*, *stylus*, *antherae* ignota. *Tubus receptaculi* 1.1 cm. longus angustissime infundibuliformis striato-sulcatus valde velutinus, ut videtur nec gibbosus nec unilaterialis ; *sepala* c. 5 mm. longa, ut videtur eglandulosa et denique reflexa ; apex *receptaculi* crateriformis ; *stamina* 8 mm. longa (vel ultra ?), libera, ut in *H. zanzibarica* postice et staminodia antice disposita. *Fructus* viridis (sed in sicco fuscus), 3.5×1.8 (? 2.0) cm., oblongo-ovoideus basi angustatus ; *pericarpium* valde durum, extra minute sed \pm dense aureo-pubescent intus lanatum ; *semen* rubrum pilis paucis basi praecipue munitum.

This tree, which is known only from the type specimens, was collected in "recently exploited *Podocarpus-Ocotea* forest" at an altitude of 1950 m. Apart from the diagnostic distinctions from *H. zanzibarica*, given above, there would appear to be further characters for differentiation in the flowers—particularly in the apparently non-gibbous calyx tube. However until further material is available it is considered advisable to avoid any distinction in floral characters.

A Manual for the Coffee-planter.*—It has been suggested that the outburst of Espresso bars in our towns marks a revival of interest in the drinking of coffee such as has not been seen since the decline of the coffee-houses of the Stuart period. The minor interest taken in coffee over so long a period at home has had its parallel in the modest production of the bean in British possessions overseas, and there has been lacking a good book on coffee-growing published in this country which might guide and stimulate the planter. This new manual on the production of coffee is therefore warmly to be welcomed as supplying a much-felt need.

The author has many years of experience as manager of a plantation and as an agricultural officer in East Africa where, we are assured on the dust-cover, "methods of cultivating coffee are now of the highest order and are seldom equalled elsewhere." After an introductory chapter on the early history of the crop, the author gives a description of the economic species of *Coffea* and their chief varieties, and a chapter on their

* Modern Coffee Production by A. E. Haarer. London : Leonard Hill (Books) Ltd. 1956, pp. 467 with 36 figures, 75 plates and coloured frontispiece, price 56/-.

genetics and breeding, before proceeding to the requirements and cultivation of the crop which occupy the greater part of the book. A later section describes production in the main coffee-growing areas and the final chapter is on the economy of production.

In his description of the cultivated species of *Coffea*, Mr. Haarer makes a gallant attempt to give a clear account of their relationships and differences. But the farther he goes, the more plainly does he reveal how muddled is our present understanding of the systematic botany of the genus. When he points out that *C. abeokutae* is thought by some to be a form of *C. liberica*, by others a form of *C. excelsa*, which itself has been called a variety of *C. dewevrei*, we can only agree with his statement that the genus is very confused, and look hopefully to the authors of the forthcoming African floras to bring some order out of chaos.

The chapter on Cytology, Genetics, and Breeding is heavy going, and it may be imagination but one seems to hear the author's sigh of relief as this chapter is ended and he passes on to the cultivation of the crop. For, once in the field, Mr. Haarer is a new man, and, whether he be setting a charge to blow up that tree-stump which interferes with his planting of coffee, or illustrating the system of pruning to be used, or preparing his coffee beans to fetch the top-price in the market, he writes with a zest and a practical knowledge of things he has done and experienced himself. This is just the information which the planter wants. Equally good is the account of coffee-production in East Africa of which he writes with such intimate knowledge. His description of the industry in Brazil and elsewhere, though less vivid, is also of interest.

The account of diseases of coffee seemed to the reviewer less successful, but he must confess to have been ruffled by the author's easy assurance that diseases are rarely troublesome if the coffee is in the correct environment and is given correct cultural treatment (surely an over-simplification), and by the author's saying "viruses may soon be found in coffee" and then proceeding to describe the symptoms a virus might produce and how it might be controlled. This he felt could well be omitted until such a disease is known. The author, in striving for completeness, tends indeed to be wordy and in places repetitive. The book is long and might benefit, like the plant, from some pruning. He is not always accurate in small things (Haiti is not, as he says, a part of the largest West Indian island), and occasionally in more important statements, as when he avers that the French have hitherto not produced large quantities of coffee in their colonies. Yet published figures for 1954 show the coffee exports of French West Africa as greatly exceeding those of the combined territories of British East Africa of which he writes so enthusiastically.

These are, however, small defects when matched against the solid worth of this book with its great fund of sound information. Both writer and publisher are to be congratulated on the production of this welcome work which can warmly be recommended to all interested in the growing and marketing of coffee and in tropical agriculture generally. The book has many illustrations adding point to matters discussed in the text, and a special word is due to the frontispiece by Mrs. Milne-Redhead which, if in reproduction it lacks the strong colouring seen in the field, yet does not fail to capture the grace and beauty of this attractive crop-plant.

T. A. RUSSELL.

NOTES ON ASIATIC GRASSES : XXVII.

A New Name in *Sporobolus*

N. L. BOR

In *Supplementum Plantarum* 107 (1781) Linn. fil. gave the name *Agrostis tenacissima* Linn. fil. to a plant growing at that time in the Uppsala Botanic Garden : a plant which is known to-day as *Muhlenbergia mexicana* (Linn.) Trin. Although the plant is stated to be "ex India orientali" there are the best of reasons for believing that this is a mistake, since *Muhlenbergia mexicana* is a native of the United States of America. The words "ex India orientali" have been responsible for the considerable confusion that exists in the nomenclature of several grasses including one Indian. It may also be mentioned here that *Agrostis tenacissima* Linn. fil. is a synonym of the earlier *A. mexicana*, a name given by Linnaeus to the same plant.

Agrostis tenacissima next appears in the literature when Jacquin in his *Coll.* 1, 85 (1787) gives this name with a description to a plant from the Carribean. He figures the plant in his *Icon. Pl. Rar. t.* 16 (1787) and his plate is sufficiently good to be recognised as representing *Sporobolus indicus* R. Br. or, if it is not this species, it is certainly a species of *Sporobolus*. Jacquin evidently considered his plant to be identical with the *A. tenacissima* of Linn. fil. for he refers to the *Supplementum* (and also to Linn., *Syst. Veg. ed.* 14), where the name originally appeared together with the description.

The next event in the history of these plants was when Humboldt, Bonpland and Kunth [or Kunth alone, according to W. T. Stearn in *Taxon* 5 (7), 153 (1956)] made a new combination in *Nov. Gen. et Sp.* 1, 138 (1816) in *Vilfa* for the *Agrostis tenacissima* of Jacquin.

In 1812 Palisot de Beauvois, in his *Essai d'une nouvelle Agrostographie* 26 (1812), transferred certain Linnean species of *Agrostis*, of which *A. tenacissima* was one, to the genus *Sporobolus*. Strangely enough, although all the other combinations are mentioned in the index, *S. tenacissimus* is not. He evidently made this new combination on the strength of Jacquin's figure.

In *Syst. Veg. ed.* 15, 2, 369 (1817) Roemer and Schultes contrasted the descriptions of *Agrostis tenacissima* given by Linn. fil. and Jacquin and, unaware that each author had a different plant before him, said that the description of Linn. fil. is the less precise and proceeded to repeat both descriptions in paraphrase or word for word. They, further, in the *Mantissa* 199 (1824) mention the *A. tenacissima* in Roxb., *Flor. Ind.* 1, 318 (1820) and conclude it is the same plant. This is, however, not so. There is an excellent drawing of *Agrostis tenacissima* Roxb. in the collection of Roxburgh's drawings at Kew and this plant can be, without doubt, referred to *Sporobolus tremulus* as Hook. f. correctly surmised.

The position in 1833 when Nees von Esenbeck published his *Agrostologia Brasiliensis* was that there was (1) *Vilfa tenacissima* based on the *Agrostis tenacissima* of Jacquin, (2) *Sporobolus tenacissimus* based on the *Agrostis tenacissima* of Linn. fil. and (3) *Agrostis tenacissima* described by Roxburgh in *Flora Indica* and presumed to be identical with *Agrostis tenacissima* of Linn. fil. but actually a different plant altogether.

When Nees came to deal with *Vilfa tenacissima* on p. 393 of *Agrost. Bras.* he first of all cites the plant as *Vilfa tenuissima* instead of *V. tenacissima*. He then quotes *Agrostis tenacissima* Jacq. and *Sporobolus tenacissimus* as synonyms. The former is, as we have seen, *Sporobolus indicus* R. Br. and the latter *Muhlenbergia mexicana* (Linn.) Trin.

Nees in adnot. goes on to say that the plant well described by Roxburgh from India, which he assumes to be the same as that of Linn. fil., is quite distinct from Jacquin's plant, and here the confusion about these plants reaches its summit.

In short, Nees called the Indian plant *Agrostis (orientalis)* quoting as synonyms *A. tenacissima* Linn. fil. non Jacq. and *A. elongata* Roth non R. Br. As Nees had accepted the genus *Vilfa*, one assumes he made a slip when he wrote *Agrostis* instead of *Vilfa*. As regards the specific epithet the significance of the brackets is not known. It seems clear, however, that Nees wished to give a new name to this species and since "*tenacissima*" was pre-occupied, as he thought, in *Vilfa*, he chose the epithet "*orientalis*". The specific epithet *tenacissima* of Linn. fil. has priority over that of Jacquin but all this is really irrelevant owing to the misidentification. Finally, Kunth completed the story by making the combination *Sporobolus orientalis* (Nees) Kunth, *Enum. Pl.* **1**, 211 (1833). This is the name which Hook. f. accepted in the *Flora of British India* for a grass common in South India and Ceylon.

If Nees considered that the *Agrostis tenacissima* of Roxburgh was identical with *A. tenacissima* Linn. fil. he had no justification for giving it a new name. Apart from this, however, Roxburgh's plant had already been named *Agrostis tremula* by Willdenow in *Sp. Pl.* **1**, 372 (1797) and therefore the name *Agrostis orientalis* Nees has no status whatsoever.

As the species of *Sporobolus* in India hitherto known as *S. orientalis* (Nees) Kunth does not appear to have a name, I propose to call it *Sporobolus maderaspatanus* Bor, and choose as the lectotype *C. A. Barber's* sheet no. 4720 from the Guntur district, Madras.

Sporobolus maderaspatanus Bor, sp. nov., cum *S. tremulo* (Willd.) Kunth comparanda sed ab eo gluma inferiore apici rotundata, haud acuta, brevioraque, foliorum laminarum marginibus serratis recedit. *S. orientalis* auctt. nomen illegitimum.

Gramen perenne, stoloniferum, radice lignoso. Culmi usque 45 cm. alti, basi geniculati, teretes, laeves glabrique, haud ramosi. *Foliorum laminae* plicatae, involutae, rare planae, pungentes, supra basin versus pilosae, marginibus scaberrimae, lanceolatae in apicem validum attenuatae; *vaginae* culmos complectentes, laeves glabraeque; *ligula* angusta, membranacea.

Panícula usque 10 cm. longa saepe ramis ascendentibus, demum ramis divaricatis; rami usque 2 cm. longi, basi nudi, spiculas brevipedicellatas congestas gerentes; rhachis ramique laeves, glabrique. *Spiculae* circa 2.25–2.5 mm. longae, ellipticae. *Gluma inferior* 0.5–0.75 mm. longa, explanata elliptico-rotunda, apici obtusa, hyalina, enervis; *gluma superior* 1.5–2 mm. longa, spiculae aequilonga vel paulo brevior, hyalina, elliptico-acuta, 1-nervis. *Anthoecium* ♂; *lemma* 2–2.25 mm.

longum, hyalinum, 1-nerve, ellipticum, acutum ; *palea* lemmati aequilonga ; *stamina* 3 ; *antherae* 1-1.25 mm. longae ; *styli* 2 ; *stigmata* plumosa ; *caryopsis* lenticularis, rugosa, 0.9 mm. longa.

IND. OR. : Madras. Guntur District, 22 Oct. 1902, *C. A. Barber* 4720 (lectotypus in Herb. Kew.) ; Kistna District, Masulipatam, Aug. 1883, *J. S. Gamble* 12581, and other sheets from Madras.

Methods of Plant Propagation.*—Successful plant propagation seems destined to remain an art as much as a science for many years to come, because there are so few generalizations about it that can be formulated. Furthermore, whilst scientific investigation has led to the production of chemicals, and other materials and to the establishment of a certain number of principles, all of which serve as aids to the propagator, these in themselves can by no means wholly replace the practical skill, knowledge, and sense of propagative capacity that is alone acquired through long experience. Mr. G. F. Gardiner, formerly Curator of the Botanic Gardens and a Recognized Teacher of Gardening in the University of Bristol, has performed a valuable service in producing a simple, practical book of instruction dealing with plant propagation by vegetative means and from seed. The 102 illustrations of the practices described have enabled the length of the text to be kept to a minimum. It seems hard to believe that anybody who conscientiously follows the simple and clearly presented recommendations can fail to meet with at least some success unless he is one of those unfortunate individuals who are destitute of sympathetic feelings towards plant life or the requirements of burgeoning plant tissues. Besides describing the basic and long established practices, Mr. Gardiner has brought the subject right up to date not only by referring to the use of so-called "hormones" which can be used as root stimulants, but also by describing the intermittent treatment of cuttings with "mist" from mechanically controlled spray nozzles. He also mentions various ways in which polythene film can be used to keep cuttings and their young roots moist without excluding air from them at the same time. One small defect has been noted on p. 114 where instructions are given for sterilizing small quantities of soil for raising ferns from spores. This description is not easy to follow or to correlate with the illustration on p. 113. This is, however, but a small defect, and amateurs and students alike who require a simple manual on the practice of plant propagation would be well advised to consult the book under review.

C. R. METCALFE.

* Pictorial Plant Propagation by G. F. Gardiner. Pp. xii + 152, 102 illustrations. C. Arthur Pearson Ltd., 1957. 18/- net.

A NEW SPECIES OF OXYGONUM.

R. A. GRAHAM

Oxygenum carnosum R. Grah. Species nova ocreis valde limbatis praedita, ab *O. limbatum* glabritate et carnalitate differt. Typus: N. Rhodesia, Northern Province, Kawambwa (S. of Lake Mweru), *Fanshawe* 2982 (K, holo. !; BR, iso. !; N. Rhodesia Forest Herbarium, iso.).

Species ramosa carnosae, praeter fructus pubescentes et filamenta omnino glabra, suffruticosa, ad 0.3 m. alta. Caulis basi decumbens, tortuosus, sulcatus, ad 5-6 mm. crassus. Internodia 1-2.5 cm. longa. Ocreae 1.5-1.9 cm. longae, apice valde foliaceo limbato, (sicco) reflexo, setis rubris basi dilatatis 2-3 mm. longis munito. Folia ex parte ocrearum superiore patentia flavo-viridia, 4.5-8 \times 0.7-3.2 cm., elliptica vel obovato- vel ovato-elliptica, sessilia, apice acuta vel obtusa semper mucronata, basi longe attenuata, margine integro vel paululum sinuato, costa subtus prominente \pm alba. Inflorescentia valida floribunda 7-9 cm. longa, pro maiore parte efoliosa. Bracteae \pm imbricatae 7-9 mm. longae apice cespitosae sed postice in apicem lanceolatum productae. Pedicelli breves, ultime reflexi, ocreas ad 5 mm. superantes. Flores subflavi, plerumque 3-jugati, heterostylosi; tepala 5-6 mm. longa, oblongo-lanceolata; flores longistylosi stylis 6 mm. longis basi per 3-3.5 mm. connatis, et filamentis 2.5 mm. longis praediti; flores brevistylosi stylis 3 mm. longis basi per 1.5 mm. connatis et filamentis 3-4 mm. longis; filamenta basi dilatata et minute puberula. Fructus trigoni, pubescentes, pendentes, striati, 6 mm. longi.

This fine species is recorded from "dambo margins or scrub savanna". Owing to its limbate ocreae it cannot be confused with any other species of the genus except *O. limbatum* and *O. dregeanum* var. *dregeanum* (which, however, only rarely produces limbate ocreae). From both of these it is told by its marked fleshiness, by its much thicker stems, by the absence of transverse wrinkles on the fruits, and from the former by being glabrous in its vegetative parts. On account of its fruit characters, its nearest specific affinity is in fact to neither of these but to *O. vanderystii* which (or forms of which) have been collected in the Kawambwa neighbourhood [e.g. *Greenway & Brenan* 8197 (K !; EA !)] : but this latter species lacks limbate ocreae, is less-fleshy with slenderer stems and inflorescences, and has interrupted, not imbricated, bracts. Whether or not our new species represents an extremely luxuriant form of *O. vanderystii* is difficult to say without further collecting in order to establish the occurrence of intermediates. The available evidence is, however, adequate to warrant specific separation from this species. Our new species would appear to be an unusually handsome member of the genus.

ENCEPHALARTOS IN CENTRAL AFRICA.

R. MELVILLE

The cycads, with their large leaves and bulky cones are awkward rather than difficult plants to collect for the herbarium. They are, in consequence, poorly and usually inadequately represented even in large national collections. When a study of the genus *Encephalartos* was undertaken for the Flora of Tropical East Africa, the need for supplementary collecting was at once obvious. After a preliminary survey, a set of instructions to collectors was drawn up, with the object of reducing, so far as possible, the labour of collecting and, at the same time, of achieving a more complete representation of the morphology of these plants, within the compass of standard sized herbarium sheets. The instructions have been modified in the light of experience and now take the following form.

Notes on Collecting Cycad Material for the Herbarium.

1. A photograph to show the habit is useful.
2. Note height and diameter of trunk, overall length and breadth of leaves, kind of indumentum on leaf bases and rachis.
3. Leaf collections should include :—
 - (a) the leaf tip,
 - (b) the leaf base showing the transition from leaflets to spines.
 - (c) The basal portion of the petiole if not included with b. This may be slit longitudinally to facilitate drying,
 - (d) a portion of the mid-region of the leaf to show typical leaflets. In large leaves, the pinnae on one side may be cut away $\frac{1}{4}$ – $\frac{1}{2}$ in. from the rachis in order that complete pinnae with undamaged tips may be preserved on the other side.
 - (e) note whether the rachis is smooth, grooved or ridged between the pinnae.
 - (f) several of the sterile scales from the trunk, that alternate with the leaves.
4. Cones. Note length and breadth of body of cone and length of stalk. Entire cones should be preserved if possible, otherwise, take for
 - (a) male cones : 2 transverse slices from the middle of the cone, to show entire rings of cone scales and 2–3 ins. of the base cut in half longitudinally.
 - (b) Female cones : 2 transverse slices as in male cones and several separate cone scales with seeds, note shape of cone or sketch shape in outline. Note colour of seeds.
 - (c) When practicable, a few cone scales of both sexes should be pickled in spirit, formalin or other liquid preservative, as shrinkage and distortion on drying are often considerable. A piece of the rachis, about 10 cms. long, from the middle of a leaf may also be included.

5. Male and female specimens from the same locality are particularly desirable.

The description of *Encephalartos* cones is not a simple task. It is often difficult to visualise, from existing descriptions, the critical features of the female cone scales and there seems to be a need for a more detailed system of terminology on which critical comparative descriptions may be based. Morphologically, the female cone scale is a single sporophyll bearing two ovules. It is not homologous, therefore, with the cone scales of pines, which consist of a fused seed-scale complex. The expanded head of pine cone scales is termed an *apophysis* and this term has been used, also, for the heads of *Encephalartos* scales. In view of the different origins of these structures, it is preferable to employ a distinctive name for the head of the *Encephalartos* scale. The term *bullæ* is here proposed; it has been used in classical literature for the boss of a shield, which the heads of some *Encephalartos* scales resemble. Among the tropical African species the cone scales have a relatively slender quadrangular pedicel and a massive bulla which is faceted and ornamented in a variety of ways. Names are required for many of these features. The nomenclature adopted in this paper will be clear by reference to the diagrams of Fig. 1, including the use of the terms breadth, height, and depth.

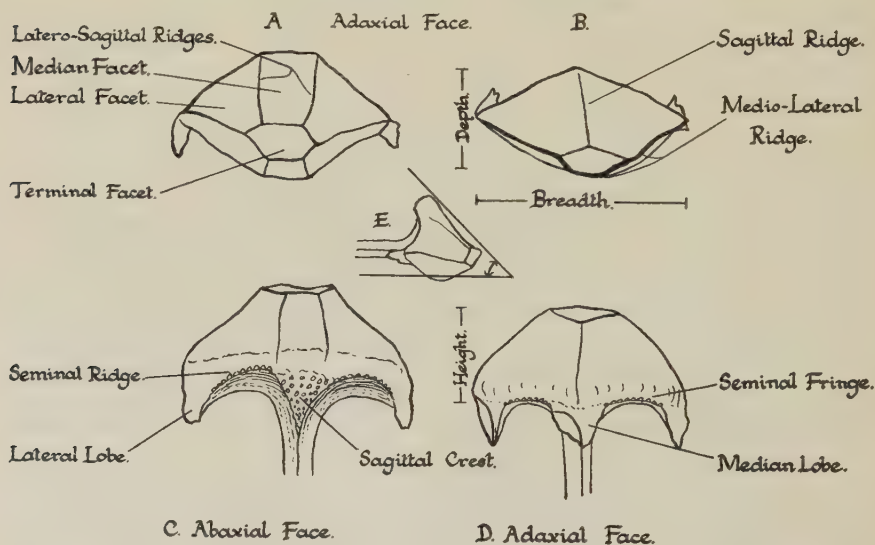


FIG. 1. Terms used in the description of the bulla of the cone scales of *Encephalartos* illustrated by diagrams of the female cone scales of *E. hildebrandtii*, A, C; *E. gratus*, B, D.

An adaxial and an abaxial face can be distinguished on the bulla—*facies adaxialis et abaxialis*. The adaxial face may consist of two trapezoidal lateral facets separated by a central, or more or less eccentric ridge, or this ridge may be partly, or completely replaced by a median facet. In some contexts the term *latus* has been used for a "face", but in this sense it refers rather to the whole side of an object than to a facet on a side. The term *vulticulus*, meaning "a little face" is here proposed. We have then, two *vulticuli laterales* separated either by a sagittal ridge—*costa sagittalis*, or by a *vulticulus medianus* and two latero-sagittal ridges—*costae*

latero-sagittales. The tip of the bulla is truncated and provided with a terminal facet—*vulniculus terminalis*. The adaxial and abaxial faces are separated laterally by more or less acute ridges—*costae laterales*—which are continuous with the lower edges of the terminal facet, forming a continuous medio-lateral ridge—*costa medio-lateralis*. The bulla is usually more or less reflexed on the pedicel and the adaxial face is inclined to the axis of the pedicel so that an angle of inclination of the bulla can be distinguished—*inclinatio bullae* which in some species is about 90° and in others $40\text{--}60^\circ$ in the dry cone scales. As seen on the intact cone, the abaxial face is usually receding and more or less hidden. It may be faceted similarly to the adaxial face, but more often the facets are poorly developed. At the lateral margins of the bulla there is a lateral lobe—*lobus lateralis*—at either side, extending backwards towards the cone axis between the seeds. In *E. gratus*, a median lobe—*lobus medianus*—is also developed on the adaxial side of the bulla, but in most species there is no more than a slight protrusion on the median angle—*angulus medianus*—which is ornamented in various ways, forming a sagittal crest—*crista sagittalis*—at the distal end of the pedicel. Similarly, a sagittal crest is commonly developed on the abaxial side of the bulla. Between the lateral lobes and the sagittal crest on the adaxial side of the bulla, the base of the seed pushes out and compresses the warts or tubercles ornamenting the margin of the bulla, forming a seminal fringe—*fimbria seminalis*. On the abaxial side, pressure of the seeds of the adjacent scale causes the development of a more or less distinct ridge on either side of the sagittal crest, the seminal ridge—*costa seminalis*. The seminal ridge may be fringe-like when it is formed by the compression of tubercles.

The facets of the bulla may be comparatively smooth, or their surfaces may be more or less irregular, by the presence of ridges, tubercles or warts. The height and density of the various forms of ornamentation increases to the margins of the bulla. The diversity of the marginal ornamentation and of the different combinations of the various kinds of protuberances, provide characters of specific value. Ridges may be relatively broad and rounded, or acute, or thin and flattened and often sinuous. They may be erect or inclined to the surface. A broad inclined ridge becomes step-like and for it the term *costa scamniformis* is proposed—from *scamnus*, a step. Similarly, there is great variation in the shapes of warts and tubercles. It seems desirable to restrict the term *verrucose* to more or less irregular warty protuberances. Protuberances taking the form of small rounded hillocks can aptly be called *colliculae* and hence the surface colliculate—*colliculatus*. When the hillocks are pointed and more or less conical, the surface may be called conicose—*conicosus*. Tubercles may be distinguished from colliculae and conae by the fact that their sides arise more or less vertically from the surface. They may be short and rounded or elongated, with the shape varying from awl shaped—*subulatus*—to blunt and slightly tapered or finger shaped—*dactyloid*, *dactyliiformis*—or more or less cylindrical—*teretus*. The tips of either long or short tubercles may have a central pit, when they become umbilicate—*umbilicatus*.

The scales of the male cones possess an expanded limb—*lamina*—on the lower surface of which the sporangia are borne. The lamina is usually sessile, or nearly so, on the cone axis and bears a reflexed bulla at its distal

end. The bulla is faceted in a manner similar to the bulla of female scales and the same terminology can be employed, so far as it applies. There is little or no ornamentation and, consequently, the male cones provide fewer characters of taxonomic value than the female cones.

The cone scales of both male and female cones become more or less distorted and atypical towards the base and the apex of a cone. It is important, therefore, to compare only median scales from the middle regions of the cones. In the present paper, the features of median scales alone are described. Occasionally the bulla of female cone scales may be attacked by fungal or insect pests, when the resultant swelling and distortion can be misleading, if its origin is not realised.

The scale leaves, that alternate on the trunk with the foliage leaves, have been much neglected. They vary considerably in shape from one species to another and bear the characteristic indumentum, which is usually evanescent on the foliage leaves. The shape of the leaf outline connecting the tips of the leaflets should be noted by collectors in the field. The apex is commonly rounded, but may taper somewhat; the base varies more widely, sometimes tapering gradually, sometimes abruptly. The transition in the lower part of the leaf from typical leaflets to spines provides some features of taxonomic value. The spines may continue up to the swollen leaf base on the trunk, or a length of bare petiole may occur. These features can be represented in herbarium specimens by appropriate selection of material. Certain others must be noted by the collector in the field, including the presence or absence of grooves or ridges on the leaf rachis between the leaflets, as these are masked by shrinkage in dry material. The colour and texture of leaflets and colours of cone scales and seeds should be noted also.

As a genus, *Encephalartos* is widely scattered through Central Africa, but the species are restricted in their distribution and doubtless represent the relicts of former much more widespread populations. In many areas, such as southern and central Tanganyika, the genus appears to be absent in spite of the existence of suitable habitats. Sufficient botanical exploration has been made of this region to have revealed any widespread species of such a conspicuous plant as *Encephalartos*. If any remain there at all, they must be confined to remote and localised habits, and are likely to represent unknown species. It is hoped that persons travelling in such country will make a special effort to collect any *Encephalartos* seen.

Fire is undoubtedly one of the important factors leading to the extermination of *Encephalartos*. Although seedlings are readily destroyed by fire, adult plants are resistant and survive all but the most intense fires. Where conditions are favourable, regeneration by seeds occurs readily. The seeds are eaten by animals and monkeys, baboons and elephants have been reported to feed upon them. Of these, baboons are by far the most important and in some areas are probably more devastating than fire in the destruction they cause. Baboons pull the cones to pieces, often before they are ripe, damage the plants and pull up young seedlings to eat the remnants of the seed within the testa. By preying upon the baboons, leopards help to preserve the balance in favour of *Encephalartos*, but, with the advance of civilisation, leopards are shot to prevent their depredations on farm stock and for the value of their skins. It seems

possible that this disturbance of the balance by man may result in the extermination of *Encephalartos*, at least in some areas, unless recent legislation to protect the leopard reverses the process.

Key to female plants.

All cone scale characters refer to median scales.

Angle of inclination of bulla of cone scales to pedicel about 80° , height of bulla small (7–10 mm. in dry specimens).

Bulla triangular or triangular truncate, adaxial margin rounded, obscurely ridged with sagittal crest tuberculate, median leaflets linear lanceolate with straight tip and 20–24 parallel nerves

1. *barteri*

Bulla rhomboid

Adaxial margin of bulla, rounded, obscurely ridged, with sagittal crest of coarse rounded warts, median leaflets oblong lanceolate, with forwardly arching tips and 26–43 parallel nerves

2. *septentrionalis*

Adaxial margin of bulla, with numerous small rounded ridges passing to \pm flattened blunt tubercles along the inner margin and sagittal crest, median leaflets, glaucescent, apiculate, with 18–24 parallel nerves 3. *poggei*

Angle of inclination of bulla of cone scales to pedicel 40 – 60° , height of bulla considerable (over 10 mm. in dry specimens)

Bulla of mature cone scales rhomboid, \pm uniformly puberulent

Adaxial margin of bulla with a well developed median lobe 4–12 mm. long, leaves 90–150 cm. long, with 30–70 pairs of leaflets

8. *gratus*

Adaxial margin of bulla with a sagittal crest of warty, finger-like processes, leaves 4–7 m. long, with about 120 pairs of leaflets

5. *laurentianus*

Bulla of mature cone scales rhomboid or subtriangular, \pm glabrous

Bulla sub-triangular, truncate, abaxial angle of pedicel \pm replaced by a ridged and tuberculate facet, scale leaves lanceolate acuminate to linear, covered, as on the swollen petiole bases, by a soft brown-buff, woolly tomentum 6. *tegulaneus*

Bulla rhomboid, angles of pedicel acute

Sagittal crest of adaxial side of bulla of flattened sinuous ridges, scale leaves triangular acuminate, covered, as on the swollen petiole bases, by a pale fawn, dense woolly tomentum.

9. *manikensis*

Sagittal crest of adaxial side of bulla at least partly of short umbilicate tubercles

Adaxial margin of bulla with step like ridges radiating from the sagittal crest, scale leaves triangular to ovate, acuminate, thick, keeled, covered, as on the swollen petiole bases, by a dense buff-brown felt 7. *bubalinus*

Adaxial margin of bulla with irregular warts or rounded, sometimes umbilicate, tubercles, scale leaves linear or cuneate, swollen petiole base glabrous at maturity . 4. *hildebrandtii*

Key to male plants.

All cone scale characters refer to median scales.

Mature cone scales with bulla \pm uniformly puberulent

Cone scales spreading \pm horizontally, limb narrow to broad cuneate.

Cone peduncle without scattered scales

Bulla narrowly triangular to truncate triangular, sometimes rostrate, median leaflets linear-lanceolate with straight tip and 20–24 parallel nerves 1. *barteri*

Bulla rhomboid to broadly triangular or plano-convex, median leaflets oblong lanceolate, with forward arching tips and 26–43 parallel nerves 2. *septentrionalis*

Cone scales ascending at about 60° to the cone axis, limb sub-quad-rangular to oblong or lyrate oblong, bulla rhomboid to subtriangular, peduncle with or without scattered scales

Cone peduncle without scales, leaves 90–150 cm. long with 30–70 pairs of leaflets, leaflet margins with 2–7 teeth mainly towards the base 8. *gratus*

Cone peduncle with scales, leaves 4–7 m. long with about 120 pairs of leaflets, leaflet margins with 9–15 teeth uniformly distributed 5. *laurentianus*

Mature cone scales with bulla glabrous or nearly so.

Cone scales ascending at about 60° to the cone axis, bulla rhombic to sub-triangular, cone peduncle with scattered scales.

Terminal facet of bulla distinct, bulla \pm convex, leaves 2–3 m. long, tapering gradually to the base, with 50–70 pairs of leaflets, green 4. *hildebrandtii*

Terminal facet of bulla indistinct, bulla \pm concave with tip out-turned, leaves, 70–150 cm. long, tapering abruptly at the base, with 20–60 pairs of leaflets, glaucescent 3. *poggei*

Cone scales deflexed or spreading \pm horizontally, leaves linear oblanceolate to oblanceolate or linear oblong, 60–180 cm. long.

Cone scales deflexed, bulla truncate-triangular with a raised quad-rangular median facet, scale leaves lanceolate acuminate to linear, as on the swollen petiole bases, covered by a soft brown-buff woolly tomentum 6. *tegulaneus*

Cone scales spreading \pm horizontally

Limb of cone scale broad cuneate, nearly straight, bulla sub-triangular to rhomboid, scale leaves triangular to ovate, acuminate, thick, keeled, as on the swollen petiole bases, covered by a close buff felt 7. *bubalinus*

Limb of cone scale sub-rectangular, cordate, strongly arched, concave, bulla rhomboid, scale leaves triangular acuminate, as on the petiole bases, covered with a pale fawn, floccose tomentum

9. *manikensis*

1. **E. barteri** Carruth. ex Miq. in Arch. Néerl., **3**, 243 (1868), as to Barter's plant only ; Prain in Fl. Trop. Afr. **6** (2), 348 (1917) ; Hutchinson and Dalziel, Fl. W. Trop. Afr. **1**, 45 (1927) ; Schuster, Pflanzenreich, **4** (1), 123 (1932) ; Chevalier, Fl. Viv. Afr. Occ. Fr., 2 (1938). Type : Nigeria, Jeba, Barter 1692 (K. iso. !).

Trunk to 30 m. high, 20–25 cm. diameter, covered with grey tomentose leaf bases and scale leaves. *Scale leaves* linear to narrowly triangular, 4.5–6.0 cm. long, 7–15 mm. wide, externally grey tomentose, internally smooth, reddish brown. *Leaves* linear-oblong, 94–165 cm. long, 15–26 cm. wide, apex rounded, base gradually tapered, rachis \pm deeply grooved between the leaflets, swollen petiole base externally shaggy grey tomentose, internally with straight appressed hairs. *Median leaflets* linear-lanceolate, 10–16 cm. long, 10–15 mm. wide, flexible, tapering uniformly from the lower $\frac{1}{3}$ – $\frac{1}{2}$ to the straight spinescent tip, abruptly contracted to the narrow basal attachment 1.5–4 mm. wide, margins with 0–2–3–6 spiny teeth \pm regularly spaced, lower surface finely striate, with 20–24 parallel nerves, lower leaflets lanceolate, passing below to simple spines terminating 6–10–20 cm. above the swollen petiole base. *Male cones* sybcylindrical, tapering slightly at the base, 8–23 cm. long, 3–5 cm. diameter, peduncles 8–20 cm. long, 5–9 mm. diameter (dry), glabrous or \pm tomentellous : *median scales* \pm horizontal, 15–20 mm. long, 12–17 mm. wide, limb triangular, tapering to the base, sporangia densely crowded ; *bulla* puberulent, deflexed, truncate-triangular, sometimes acuminate and \pm rostrate ; adaxial face with two, often oblique, latero-sagittal ridges 2–5 mm. apart ; median facet rectangular ; terminal facet rhomboid to polygonal, 4–8 mm. wide, 2–4 mm. deep ; medio-lateral ridge acute, forming the lower visible margin of the bulla ; abaxial face receding, 2–3 mm. deep in the centre, or up to 6 mm. in rostrate bullae, tapering laterally, with a prominent sagittal ridge. *Female cones* oblong-ellipsoid, 12–35 cm. long, 8–15 cm. diameter, dark olive green, peduncle 5–12 cm. long, 1.5–3.5 cm. diameter : *bulla of median scales* glabrous deflexed 4.5–5.6 cm. wide, 2.0–3.8 cm. deep, truncate triangular, *adaxial face* with two, often oblique latero-sagittal ridges 5–12 mm. apart ; median facet rectangular ; adaxial margin straight or with an obtuse median angle, rounded, slightly undulate, with a few colliculae and an ill-defined seminal fringe ; sagittal crest not prominent, with a few rounded tubercles ; *terminal facet* compressed hexagonal, 10–30 mm. wide, 5–14 mm. deep ; *abaxial face* crescentic, 5–12 mm. deep in the middle, \pm undulate and with a few colliculae along the inner margin ; seminal ridge ill-defined ; *lateral lobes* triangular to irregularly quadrangular, \pm flattened, 10–15 mm. long, outer facets with low undulate ridges, or \pm verrucose, angles acute, sub-entire or \pm dentate ; *pedicel* quadrangular 15–17 mm. long. *Seeds* ovoid to subglobose \pm 3-angled, 21–30 mm. long, 18–23 mm. diameter, scarlet, with a semi-ovate to semielliptic attachment scar 7–10 mm. long.

Distribution : Ghana, Dahomey, Nigeria, Sudan, Uganda.

Hitherto, *E. barteri* has been regarded as a purely West African species. Its recent collection in north west Uganda and in the adjacent parts of the Sudan is of some phytogeographical interest, although paralleled by similar distributions in other genera such as *Indigofera* and *Cochlospermum*. In its eastern habitats *E. barteri* is sometimes associated with *E. septentrionalis* and further more complete collections of both plants are needed to determine whether there is any intergrading and whether there are recognisable differences between plants from western and eastern localities.

Among material hitherto identified as *E. barteri* is a specimen collected by Chipp West of Abene (Gold Coast). This differs from typical *E. barteri* in the shape and other features of the female cone scales. Plants that appear to be similar, have recently been reported by Mr. G. K. Berrie to be in cultivation at Vom in Nigeria. These are believed to have originated from Bokkos on the plateau some 30 miles away and it is hoped to obtain complete material of the native plants for investigation.

2. ***E. septentrionalis*** Schweinf. in Bot. Zeit., **29**, 334 (1871) ; Prain Fl. Trop. Afr., **6** (2) 350 (1917) ; Schuster, Pflanzenreich **4** (1) 122 (1932) ; Chevalier, Fl. Viv. Afr. Occ. Fr., **3** (1938) ; Eggeling, Ind. Trees Uganda, 55 (1940) ; Andrews, Fl. Plts. A.-E. Sudan, **1**, 1 (1950).

Syntypes : Sudan ; Gumango, Schweinfurth 2952 (K !) ; near Nganye, Schweinfurth 3992 (K !).

Trunk globose or up to 2 m. high and 30 cm. diameter. *Leaves* linear-oblong, 90–150 cm. long, 20–28 cm. wide, with rounded apex and tapering base, at first grey tomentose, finally \pm glabrous, swollen petiole base with dense, persistent, woolly, grey to grey-buff tomentum, rachis distinctly grooved between the leaflets. *Median leaflets* oblong to lanceolate, 10–18 cm. long, 17–28 mm. wide, margins slightly reflexed, with 2–4–7 spiny teeth, often crowded towards the base, upper margin straight or arching forward at the apex, lower margin curving upwards to the forwardly directed pungent apex, basal attachment rather broad, 5–9 mm. wide, lower surface finely striate, with 26–43 parallel nerves ; lower leaflets coarsely spiny, passing from ovate-lanceolate to ovate, then to tri- and bi-furcate spines and to simple spines terminating just above the swollen petiole base. *Male cones*, 4–10, narrowly ellipsoid, or tapering in the upper half, 12–20 cm. long, 3.0–4.5 cm. diameter, pedicels slender, 10–15 cm. long, 5–12 mm. diameter : *median scales* horizontal, limb triangular, 12–22 mm. long, tapering to the base, with straight or slightly convex margins, sporangia densely crowded ; *bulla* 15–25 mm. wide, 6–10 mm. deep, deflexed, rhomboid to semi-elliptic, puberulent ; adaxial face with an ill-defined sagittal ridge or with 2 latero-sagittal ridges 1–4 mm. apart, sometimes eccentric and oblique, surface \pm uniform except at the wrinkled adaxial margin, which is straight or obtusely angled ; terminal facet lenticular to rhomboid or compressed hexagonal, $\frac{1}{3}$ – $\frac{2}{3}$ the breadth of the bulla, 6–15 mm. wide, 2–6 mm. deep, lower margin angular or arching ; lateral ridges acute, straight or arched ; abaxial face receding, depth \pm uniform, 3–4 mm., with a prominent sagittal ridge or a triangular median facet 4–8 mm. deep. *Female cones* cylindrical, base rounded, 23 cm. long, 11 cm. diameter, pedicel short,

3-4 cm. diameter : *bulla* of median scales rhomboid, deflexed, angle of inclination to pedicel, in dry scales, 80-90°, 4.5-5.0 cm. wide, 2.0-2.7 cm. deep ; *adaxial face* puberulent, subrhomboid, with an ill-defined sagittal ridge or a narrow triangular median facet 1-2 mm. wide, and obtuse median angle ; lateral ridges acute, arched ; surface \pm uniform passing at the rounded, obscurely ridged adaxial margin to the low rounded colliculae or verrucae of the seminal fringe and sagittal crest ; *terminal facet* rhomboid to semi-elliptic 14-17 mm. wide, 5-7 mm. deep ; *abaxial face* receding, in the dry scale forming, by shrinkage, arched to straight folds \pm parallel with the medio-lateral ridge, as an apparent lower margin to the bulla, with, below, a prominent sagittal ridge bearing a narrow, irregularly ridged to verrucose sagittal crest ; seminal ridge crenate-dentate, of compressed rounded verrucae ; *lateral lobes* 3-6 mm. long, triangular to irregular, outer facets undulately ridged to bluntly verrucose and angles dentate to crenate-dentate ; *pedicel* quadrangular 20-25 mm. long. *Seeds* ellipsoid to ovoid or subglobular, \pm 3-4 angled, 23-34 mm. long, 16-24 mm. diameter, scarlet, with a semicircular to broadly semioval attachment scar 7-15 mm. long, 5-10 mm. wide.

Distribution : Uganda, Sudan, Ubangi-Uele (Congo Belge), Haut Chari.

The above description has been pieced together from a number of collections, none of which was complete in itself. The characters of the female cone are based mainly on Anthony 700, from the Zande Districts, Equatoria Province Anglo-Egyptian Sudan. For the male cones, the appropriate part of Anthony 700 was used, with Eggeling 3578, from the Imatong Mountains, Uganda and F.D. 2055 from the Era Reserve, West, Madi District, Northern Province, Uganda. The two latter collections differ in that Eggeling 3578 has a densely buff-tomentose peduncle and scales with rhomboid bullae, while F.D. 2055 has the cone peduncle glabrous and scales with semi-elliptic bullae. These differences may not be due entirely to differences in the maturity of the cones and further collection and field work is necessary.

3. **E. poggei** *Aschers.* in Verh. Bot. Brandenburg **20**, XXXV (1878) ; Prain, Fl. Trop. Afr. **6** (2) 349 (1917) ; Schuster, Pflanzenreich **4** (1), 122 (1932) ; Robyns, Fl. Congo Belge **1**, 3 (1948). Type : Belgian Congo, between the Luisa and Casserigi Rivers, Pogge, s.n., 1876.

Syn. *E. lemarinelianus* De Wild. et Th. Dur. in Bull. Soc. Roy. Bot. Belg. **39** (4), 80, 1900 (1901) ; De Wild. in Ann. Mus. Congo Belge, Bot., Ser. 5, **1**, 9, tt. 23-4 (1903). Type : Belgian Congo, right bank of the Lubi, Le Marinel 1891, cult. Lusambo, coll. Laurent 1896. (Brussels, holo. !).

Trunk globular or cylindrical, to 1 m. high. *Leaves* linear oblanceolate, tapering rather abruptly at the base, 70-150 cm. long, 14-27 cm. wide, with 18-60 pairs of leaflets, rachis slightly arched above, deeply arched below, ridged between the leaflets, swollen petiole base with shaggy greyish tomentum. *Median leaflets* linear lanceolate, straight or falcate, 8-15 cm. long, 7-13 mm. wide, glaucescent, apex pungent, apiculate,

base tapered abruptly above the 7–10 mm. wide basal attachment, margins unarmed or with 1–4 spiny teeth, usually near the base, striate below with 18–24 parallel nerves; lower leaflets lanceolate, 5.5–4.0 cm. long, passing abruptly to bifurcate and simple spines, terminating about 5 cm. above the swollen petiole base. *Male cones* cylindrical, greenish to yellowish, 10–30 cm. long, 3–7.5 cm. diameter, peduncle 8–21 cm. long, 8–20 mm. diameter, with scattered bracts in the upper part: *median cone scales* ascending, lamina cuneate to sub-quadrangular, apex acute, 18–36 mm. long, 14–26 mm. wide, concave above, densely covered by sporangia below, except for a margin 0.5–1.5 mm. wide; *bulla* sharply deflexed with its flattened to concave face \pm receding and the adaxial median angle projecting, rhomboid to sub-triangular, 18–26 mm. wide, 14–18 mm. deep, the facets often poorly differentiated; adaxial face with 2 latero-sagittal ridges 2–5 mm. apart enclosing a triangular or quadrangular median facet; adaxial margin subacute with an obtuse to sub-acute median angle; terminal facet indistinct, concave, hexa- or pentagonal, $\frac{2}{3}$ – $\frac{2}{3}$ as wide as the bulla; medio-lateral ridge acute, forming the lower, visible edge of the bulla, with an obtuse or truncate median angle; abaxial face receding, hidden, of two narrow triangular facets meeting in a distinct, obtuse sagittal ridge 3–7 mm. long. *Female cones* ovoid-oblong, green, finally rose-salmon, 17–23 cm. long, 9–12 cm. diameter, base rounded or truncate, apex slightly tapering, peduncle short, 2–5 cm. diameter. *Bulla of median scales* deflexed, rhomboid, 4–5 cm. wide, 2.0–2.7 cm. deep, the facets often poorly differentiated; *adaxial face* with 2 trapezoidal facets and an obscure sagittal ridge, or with 2 latero-sagittal ridges 7–20 mm. apart, one often very eccentric and the lateral facets of very unequal size, surface uniform, passing at the adaxial margin into plicate ridges and to \pm compressed dactyloid tubercles at the seminal fringe; *terminal facet* rhomboid to 5–6-gonal, sometimes laterally elongated, $\frac{1}{2}$ – $\frac{2}{3}$ as wide as the bulla, medio-lateral ridge \pm acute with the lateral ridges straight or arched; *abaxial face* receding, \pm hidden, crescentic, with a sagittal ridge 5–8 mm. long, or 2 latero-sagittal ridges, surface uniform, passing at its inner margin into low ridges and to irregularly plicate rounded ridges at the sagittal crest, with flattened dactyloid tubercles along the seminal ridge; *lateral lobes* triangular to irregular, 4–10 mm. long, with the angles acute, entire or \pm dentate, outer facets with low, rounded, irregular ridges; *pedicel* quadrangular, 2.0–2.5 cm. long. *Seeds* ellipsoid to oblong-ellipsoid or ovoid, 20–33 mm. long, 17–23 mm. diameter, red.

Distribution: Congo Belge, Kasai, Bas Katanga: Angola.

4. **E. hildebrandtii** A. Br. et Bouché in Ind. Sem. Hort. Berol. 18 (1874); Engler, Pflanzenwelt Ost-Afr. **C**, 92 (1895); Prain, Fl. Trop. Afr. **6** (2) 351 (1917); Peter, Fl. Deutsch Ost. Afr. 99 (1929); Schuster, Pflanzenreich **4** (1) 118 (1932); Brenan, Check List T.T., **1**, 80 (1940). Type: Kenya, Mombasa, Hildebrandt s.n. (B. holo, K. iso.!).

Syn. *E. laurentianus* Auct. non De Wild., Prain et Robyns loc. cit. supra, in part, as to Uganda plant, et Eggeling, Indig. Trees Ugand. 55 (1940).

Trunk to 6 m. high and 30 cm. diameter. *Scale leaves* linear to narrowly triangular, 10–15 cm. long, 4–20–35 mm. wide, densely fulvous tomentose outside, glabrous, chestnut brown inside except for the tomentose tip. *Leaves* linear oblanceolate, 2–3 m. long, 30–65 cm. wide tapering slightly to the rounded apex and gradually to the base, rachis rounded above, not or very shallowly grooved between the leaflets, swollen petiole base at first fulvous, woolly-tomentose, exposed parts glabrous at maturity. *Median leaflets* linear lanceolate, 15–35 cm. long 13–45 mm. wide, apex acuminate, pungent or with 2–3 spiny teeth, base nearly straight below, arching above, margin with 1–4–9 spreading spiny teeth on each side, often crowded near the base, coriaceous, glossy dark green above, paler below and obscurely striate with 26–40 parallel nerves; lower leaflets palmate, spiny, passing to trifurcate, bifurcate and simple spines extending to the swollen petiole base. *Male cones* cylindrical to subconical or fusiform, 20–50 cm. long, 5–9 cm. diameter, greenish to dull red, peduncle 5–25 cm. long, 1.5–3.0 cm. diameter, with scattered scale leaves; *median cone scales* ascending, lamina oblong, tapering to the base, 20–36 mm. long, 23–28 mm. wide, margins straight or contracted to the pedicel; *bulla* deflexed, compressed rhomboidal to sub-triangular, 19–28 mm. wide, 9–17 mm. deep, glabrous, adaxial face of 2 trapezoidal facets and a sagittal ridge or with an eccentric, rectangular, median facet 3–6 mm. wide; adaxial margin rounded; terminal facet rhomboid, $\frac{1}{3}$ – $\frac{1}{2}$ as wide and as deep as the bulla; lateral ridges acute, straight or arched; medio-lateral ridge forming the lower margin of bulla; abaxial face receding, smooth, with a blunt sagittal ridge and 2 \pm oblong lateral facets. *Female cones* cylindrical, 28–60 cm. long, 15–25 cm. diameter, dull yellow, apex rounded or abruptly tapering, base rounded, peduncle 4–6 cm. long, 4–6 cm. diameter: *bulla* of median scales deflexed, rhomboid, 3.5–5.0 cm. wide, 2.0–3.3 cm. deep; *adaxial face* with 2 trapezoidal facets and a median rectangular facet 11–14 mm. wide, with obtuse latero-sagittal ridges; surface smooth except at the adaxial margin where it becomes irregularly verrucose or passes into irregular ridges and then to smaller verrucae or to simple or umbilicate tubercles, compressed at the seminal fringe; lateral ridges obtuse, straight or \pm arching; *terminal facet* compressed hexagonal or pentagonal, 12–23 mm. wide, 8–15 mm. deep, \pm concave; *abaxial face* receding, sub-crescentic, with 2 obscure latero-sagittal ridges, smooth, except at the inner margin where the ornamentation is similar to that of the adaxial margin, seminal ridge ill-defined; *lateral lobes* triangular to irregular, 7–15 mm. long, with lateral facets verrucose or tuberculate and angles acute, \pm irregularly dentate; *median lobes* not developed; *pedicel* quadrangular, 2.2–3.0 cm. long; *seeds* vermillion, ovoid, truncate 20–38 mm. long, 16–26 mm. diameter.

var. **hildebrandtii**: squamae masculinae et femineae costis medio-lateralibus bullarum edentatis.

In coastal evergreen bushland from sea level to 450 m. Uganda: Toro District. Kenya: Kilifi District.

Tanganyika: Lushoto District, E. Usambaras: Tanga District. Zanzibar.

var. **dentatus** Melville, var. nov. a var. *hildebrandtii* squamae masculinae et femineae costis medio-lateralibus bullarum lateribus divaricato-dentatis differt.

Type : Wigg 1044, Dar-es-Salaam, cult. (K. Holo.!).

Known only from cultivated specimens.

The plants from the Mpanga River in the Toro District of Western Uganda are to some extent intermediate between *E. laurentianus* De Wild. of the Congo basin and the typical *E. hildebrandtii* of the coastal areas of Kenya and Tanganyika. They are placed here under *E. hildebrandtii* as the mature female cone scales are glabrous and in their ornamentation they more closely resemble that species, although Prain, Eggeling and Robyns had accepted them as *E. laurentianus*. It seems likely that these Congo, W. Uganda and East Coast forms at one time formed a topocline of which only the remnants survive today. I have seen only scanty and incomplete specimens of the two western forms and it is possible that when fuller material is available, their status will have to be reconsidered. If the clinal concept is correct, the plant of the Duki River locality, cited by Schuster in his monograph, should come close to the Mpanga River form.

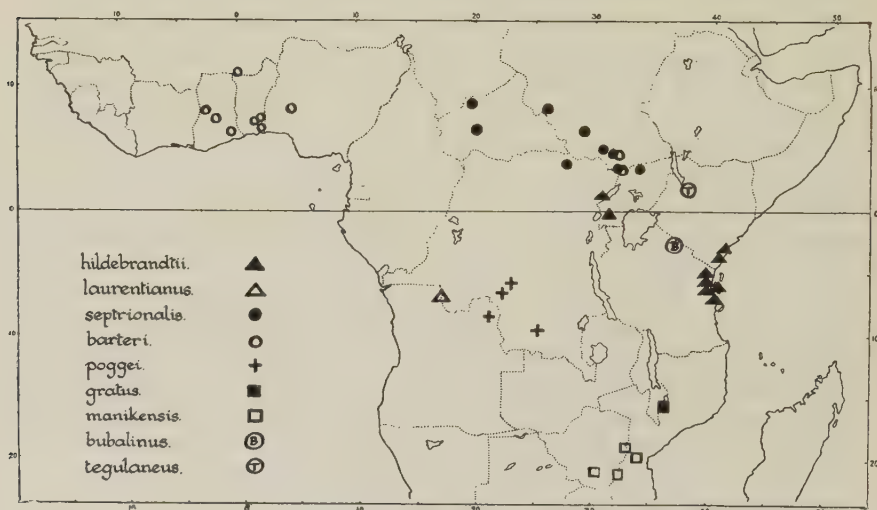


FIG. 2. Distribution of *Encephalartos* in Central Africa.

5. ***E. laurentianus*** De Wild. in Ann. Mus. Congo Belge, Bot. Ser. V (1), 10, t. 25 (1903) et Nat. Pl. Util. Congo, **1**, 392, tt. 27–28 (1904); Gentil, Rev. Hort. Belge **30**, 7 (1904); Prain, Fl. Trop. Afr., **6** (2), 354 (1917), excluding the Uganda plant; Lebrun in Rev. Zool. Bot. Afr., **19**, 384, f. 1–5 (1930); Schuster, Pflanzenreich, **4** (1), 121 (1932), excluding the Uganda plant; Robyns, Fl. Congo, Belge, **1**, 2 (1948), excluding the Uganda plant, non Eggeling, Indig. Trees Uganda, 55 (1940). Type : Belgian Congo, Kasongo, Kwango River, Gentil 98, Aug. 1902 (Brussels, holo.!).

Trunk to 15 m. long and 125 cm. diameter, often decumbent and serpentine, whitish, marked by scars of the leaf bases. Leaves linear-

oblong, 4-6 m. long, 50-90 cm. wide, apex rounded, tapering gradually to the base, with about 120 pairs of leaflets, rachis keeled above, rounded below, rachis and swollen petiole base covered at first with a reddish tomentum. *Median leaflets* linear lanceolate, 35-50 cm. long, 4-7 cm. broad, apex acuminate, pungent, or tridentate, margins slightly reflexed, with 9-15 spreading or forwardly directed pungent teeth \pm evenly distributed, base with anterior margin rounded and posterior margin straight, lower surface with 45-65 parallel nerves, basal attachment 13-15 mm. wide; lower leaflets ovate-lanceolate, passing gradually to divaricately spiny-palmate, 3-4 cm. long, then to bifurcate and to simple spines terminating 30-40 cm. above the swollen petiole base. *Male cones* 2-6 or 8, ellipsoid to subconical 17-35 cm. long, 6-10 cm. diameter, peduncle 25-30 cm. long, 4-5 cm. diameter, red tomentose, with scattered scales towards the top. *Median cone scales* ascending, limb subquad-rangular to oblong, 2-3 cm. long, 20-25 mm. wide, \pm tapering to the base, margins acute, arching, lower surface with a marginal band 2-3 mm. wide free from sporangia; *bulla* reflexed, reddish puberulent, rhomboid to subtriangular, 18-25 mm. wide, 10-13 mm. deep; adaxial face with a sagittal ridge or 2 latero-sagittal ridges enclosing a rectangular median facet 4-5 mm. wide, or a small triangular facet; adaxial margin rounded; terminal facet $\frac{2}{3}$ - $\frac{1}{2}$ as wide as the bulla, rhomboid to pentagonal or sub-triangular; abaxial face receding, crescentic, with a sagittal ridge or a triangular median facet. *Female cones* 2-4 ellipsoid to oblong-ovoid, 35-45 cm. long, about 20 cm. diameter, apex rounded, base truncate, peduncle short, about 7-8 cm. diameter; *bulla* of median scales, rhomboid, deflexed, with dark reddish puberulence; *adaxial face* with 2 trapezoidal facets and a rectangular median facet about 12-14 mm. wide; surface smooth, passing at the abaxial margin to irregular ridges and to umbilicate tubercles at the sagittal crest, which is sometimes replaced by a small, irregularly triangular median lobe with rounded verrucae and dactyloid tubercles; lateral ridges acute, straight or arching; *terminal facet* subrhomboid, hexagonal or pentagonal, $\frac{1}{3}$ - $\frac{1}{2}$ as wide as the bulla; *abaxial face* receding, with an obtuse sagittal ridge or 2 latero-sagittal ridges 10-15 mm. apart, surface uniform, passing to irregular ridges and folds and to umbilicate tubercles along the seminal ridge; *lateral lobes* subtriangular, 18-22 mm. long, the outer facets with small irregular ridges, angles acute, irregularly dentate to sub-entire; *pedicel* quadrangular, about 3.5 cm. long. *Seeds* vermilion, oblong-ellipsoid, 40-50 mm. long, 24-28 mm. diameter, attachment scar semi-ovate, 17-19 mm. long, 10-12 mm. wide.

Distribution: Congo Belge; Angola. Valley of the Kwango from its confluence with the Fufu southwards, to that with the Kikasu and tributary valleys on both sides of the border.

6. **E. tegulaneus** *Melville*, sp. nov. Truncus 7 m. altus, 33-50 cm. diametro. Cataphylla acuminato-lanceolata vel linearia extra tomento bubalino-lanoso dense induta. Folia lineari-oblancoolata, basi sensim attenuata, 120-180 cm. longa, 30-40 cm. lata, circa 90-95 jugis foliorum praedita, basibus petiolorum lana bubalina indutis. Foliola mediana oblongo-lanceolata, pungentia, 16-32 cm. longa, 16-28 mm. lata, marginibus edentatis vel 1-3-dentatis, basibus aequaliter attenuatis.

Strobilus masculus cylindricus, circa 42 cm. longus, 13 cm. latus, pedunculo 20 cm. longo, 2.5 cm. lato, ebracteato ; *microsporophylla mediana deflexa*, *rhomboidea*, 45–50 mm. longa, 24–28 mm. lata ; *bullae truncato-triangulares*, 22–25 mm. latae, 14–16 mm. profundae, *facierum adaxialium vulticulo mediano* 4–8 mm. lato elevato, *vulticulis terminalibus*

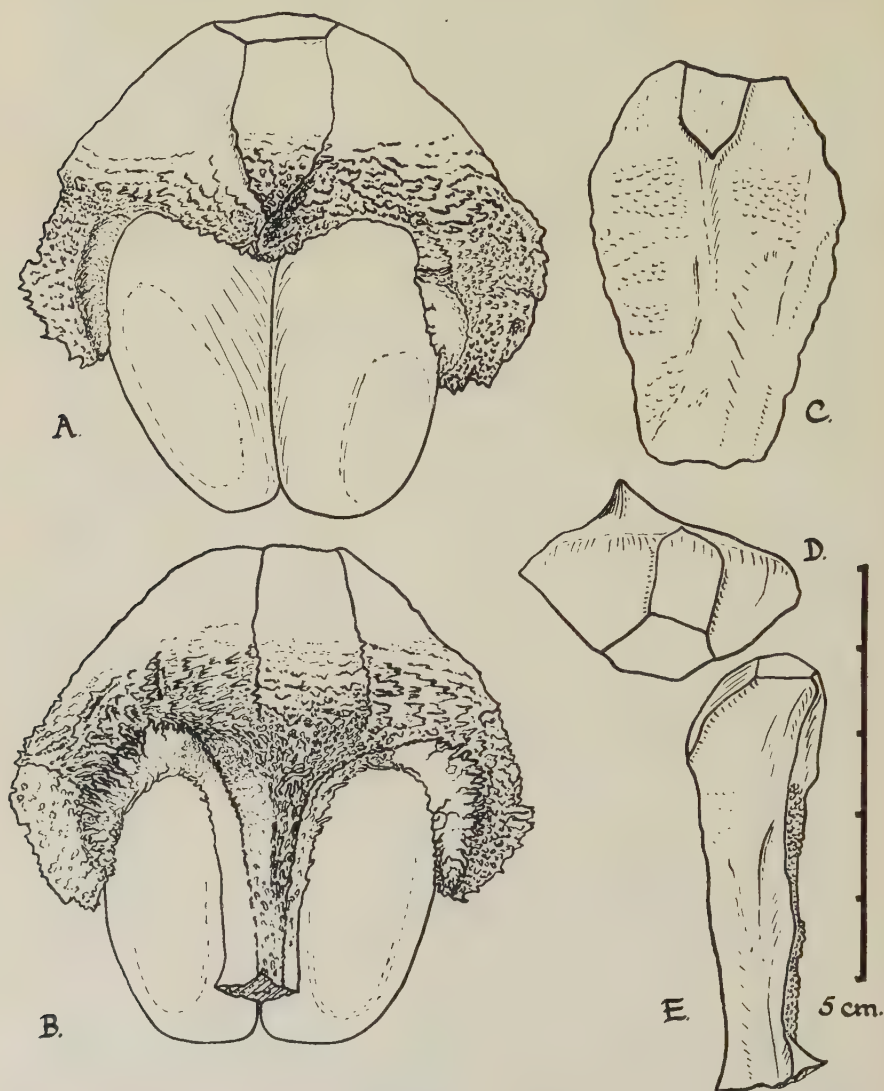


FIG. 3. *Encephalartos tegulaneus* Melville. Median scale of the female cone : A, adaxial face ; B, abaxial face. Median scale of the male cone : C, adaxial face ; D, distal end showing adaxial face of bulla ; E, lateral view.

pentagonis vel quadrangulis vel rhomboideis ; *strobilus femineus cylindricus*, *apice rotundato*, *basi rotundato vel truncato*, circa 40 cm. longus, 19 cm. latus, *pedunculo* 9 cm. longo, 3.5 cm. lato. *Bulla megasporophyllorum medianorum subtriangularis*, *truncata*, *deflexa*, 5.0–6.0 cm. lata, 23–32 mm. profunda, *faciei adaxialis vulticulo mediano*

elevato rectangulo 8–12 mm. lato, postice costis obliquis verrucosis et tuberculis dactyloideis praedita; fimbriae seminales tuberculis dactyloideis applanatis praeditae; vulticulus terminalis subrhomboideus vel hexa- vel pentagonus, 14–20 mm. latus, 8–15 mm. profundus; facies abaxialis postice costis subacutis et tuberculis obliquis dactyloideis; costa seminalis tuberculis applanatis; lobi laterales triangulares vel quadranguli, 11–17 mm. longi, vulticulis exterioribus oblique costatis vel verrucosis; pediculus \pm quadrangulus, 26–32 mm. longus, angulo abaxiali vulticulo irregulariter tuberculato substituto. Semina oblongo-ellipsoidea, 30–37 mm. longa, 18–23 mm. lata. Type: Kenya, Matthews Range, Lololokwe, 2300 m., J. Adamson, May 7, 1954 (Holo. K.!).

Trunk cylindrical, to 7 m. high, 30–50 cm. diameter, covered by scars of abscised leaves and scale leaves in alternating bands, leaf scars flat or depressed rhomboid, tapering laterally 8–9 cm. wide, 3.0–3.7 cm. deep, scale leaf scars rhomboid to fusiform, 3.0–3.5 cm. wide, 1–2 cm. deep. *Scale leaves* lanceolate acuminate to linear, 8–18 cm. long, 0.5–3.5 cm. wide, externally with a dense woolly brownish-fawn tomentum, internally glabrous, brown. *Leaves* linear-ob lanceolate, tapering slightly to the rounded apex and gradually to the base, 120–180 cm. long, 30–40 cm. wide, with about 90–95 leaflet pairs, rachis distinctly grooved between the leaflets, swollen petiole base densely covered with brownish-buff, woolly tomentum. *Median leaflets* oblong-lanceolate, 16–22 cm. long, 16–28 cm. wide, rigid, coriaceous, margins reflexed, edentate or with 1–3 short spiny teeth near the base on the anterior side and one on the posterior side, tip pungent with anterior margin straight or arched and posterior arched, base \pm uniformly tapered, basal attachment 8–12 mm. wide, lower surface \pm distinctly striate with 28–46 parallel nerves; lower leaflets lanceolate to ovate lanceolate, with 3–6 spines on the anterior margin and 2–3 on the posterior, passing to spiny ovate and trifurcate leaflets and a few simple, just above the swollen petiole base. *Male cones* sub-cylindrical, tapering abruptly at the apex and gradually in the lower $\frac{1}{3}$ to the base, about 42 cm. long, 13 cm. diameter, peduncle 20 cm. long, 2.5 cm. diameter, ebracteate, tapering to the base, fawn tomentose in the lower $\frac{2}{3}$. *Median cone scales* deflexed, rhomboid, with the bulla arching downwards, 45–50 mm. long, 24–28 mm. wide, base 10–15 mm. wide, median longitudinal ridge distinct on the upper, prominent on the lower surface; *bulla* 22–25 mm. wide, 14–16 mm. deep, truncate-triangular; adaxial face with \pm unequal, triangular lateral facets and a raised quadrangular median facet 4–8 mm. wide; terminal facet pentagonal to subquadrangular or rhomboid, 9–13 mm. wide, 5–8 mm. deep, flat or \pm concave; medio-lateral ridge acute; abaxial surface, hidden, receding, with a prominent acute sagittal ridge or a raised, elongated, quadrangular median facet tapering into the median longitudinal ridge of the limb. *Female cones* cylindrical, about 40 cm. long, 19 cm. diameter, apex rounded, base rounded-truncate, peduncle 9 cm. long, 3.5 cm. diameter, fawn tomentose below. *Bulla of median scales* subtriangular, truncate to truncate-sagittate with the lateral lobes, 5.0–6.0 cm. wide, 23–32 mm. deep; *adaxial face* with 2 trapezoidal lateral facets and a subacute or narrowly triangular sagittal ridge, or with 2 unequal lateral facets and an acentric quadrangular median facet up to 12 mm. wide between raised, subacute latero-sagittal ridges; surface smooth distally, passing to low

rounded irregular ridges and then to irregular, subacute laterally inclined ridges by the adaxial margin and to dactyloid tubercles along the seminal fringes and sagittal crest ; *terminal facet* subrhomboid, hexagonal or pentagonal, 14–20 mm. wide, 8–15 mm. deep, flat to concave, uniformly covered with small pits and furrows ; lateral ridges subacute, straight or slightly arched ; *abaxial face* receding, truncate-triangular, with facets similar to, but less distinct than those of the adaxial face ; surface smooth distally, passing to low rounded irregular ridges, then to irregular, acute, laterally inclined ridges, sometimes with dactyloid processes, and to dactyloid tubercles at the seminal ridge ; sagittal crest with low verrucae and appressed dactyloid tubercles ; *lateral lobes* triangular to quadrangular, 11–17 mm. long, lateral facets verrucose or verrucosely ridged, inner facets of smoothly compressed ridges and dactyloid tubercles running out to the irregularly dentate angles ; *pedicel* subquadrangular, 26–32 mm. long, lateral and adaxial angles \pm irregularly dentate in the distal half, abaxial angle more or less replaced by a triangular or quadrangular facet covered with appressed, short or long irregular to dactyloid tubercles. *Seeds* oblong, truncate, \pm 3-angled, scarlet, 30–37 mm. long, 18–23 mm. diameter, attachment scar ovate, 9–10 mm. long, 6–7 mm. wide.

The material on which the above description is based was collected by Mrs. Joy Adamson on Mount Lololokwe, known to the Samburu as Sabatchi, in the Matthews Range, about 35 miles north of Isiolo, Kenya. My thanks are due to her for the excellent and complete specimens that she obtained, which were accompanied by some fine photographs of the plants in their natural setting and a water-colour sketch. The mountain rises abruptly from about 3000 ft. up to about 7000 ft., where "there is heavy cedar forest on top, date palms, and a few and huge candelabra Euphorbias. The Cycas palm grows either on bare rock or in thickest forest or near springs". The epithet *tegulaneus* refers to the scales of the male cone, which overlap like the tiles on a roof.

7. **E. bubalinus** *Melville*, sp. nov. Truncus erectus vel prostratus, ad 137 cm. altus, 33 cm. diametro. Cataphylla plantarum feminearum triangularia vel ovato-acuminata, 10–14 cm. longa, 40–45 mm. lata, 10–15 mm. crassa, carinata, faciebus abaxialibus lana coactili bubalina indutis, ea masculinarum linearia vel lanceolato-acuminata. Folia oblanceolata, 60–165 cm. longa, 20–30 cm. lata, jugis 50–90 foliolorum, apice rotundato, ad basin attenuata, basibus petiolorum lana coactili bubalina dense indutis. Foliola media linearia, apicibus pungentibus, basibus abrupte attenuatis in rhachin per 10–13 mm. decurrentibus, marginibus anterioribus prope basin 2–4-dentatis, posterioribus edentatis vel unidentatis. Strobilus masculus ellipsoideus vel subcylindricus, 11–22 cm. longus, 5.5–6.0 cm. latus, apice et basi rotundato, pedunculo ebracteato, diametro circa 1.5–2.0 cm. ; microsporophylla mediana late cuneata, patentia, 23–30 mm. longa, 20–25 mm. lata ; bullae deflexae, \pm applanatae, subtriangulares, vel rhomboideae, 20–25 mm. latae, 7–15 mm. profundae, faciebus adaxialibus costis latero-sagittalibus 2 leviter elevatis, vulticulo mediano rectangulo vel triangulati 2–6 mm. lato praeditis, vulticulis terminalibus rhomboideis vel hexagonis vel pentagonis. Strobilus femineus non visus ; bulla megasporophyllorum medianorum

deflexa, rhomboidea, circa 6 cm. lata, 3.6 cm. profunda; facies adaxialis vulticulis lateralibus 2 trapezoideis et vulticulo mediano rectangulo 8–12 mm. lato instructa, margine adaxiali et crista sagittali tuberculis umbilicatis teretibus praeditis, fimbriis seminalibus, irregulariter dentatis tuberculis applanatis; vulticulus terminalis rhomboideus vel hexagonus, circa 20–26 mm. latus, 10–14 mm. profundus; facies abaxialis sublunata, margine interiore costis scamniformibus subacutis instructo, crista sagittali tuberculis umbilicatis brevibus vel verrucis ornata, costa seminali tuberculis applanatis; lobi laterales triangulares, irregulares vel applanati, circa 10–13 mm. longi, vulticulis exterioribus tuberculis parvis plerumque umbilicatis vel verrucis parvis instructis; pediculus acute quadrangulus angulis adaxialibus et abaxialibus sub crista sagittali tuberculato-dentatis. Semina ellipsoidea vel late ovoidea, 34–42 mm. longa, 21–26 mm. lata. Type: Tanganyika Northern Province, Masai District, Moluvane near Ol Doinyo Sambu, between Loliondo and Lake Natron, 2° 11' S., 35° 40' E., Bally 10600 (K. holo!).

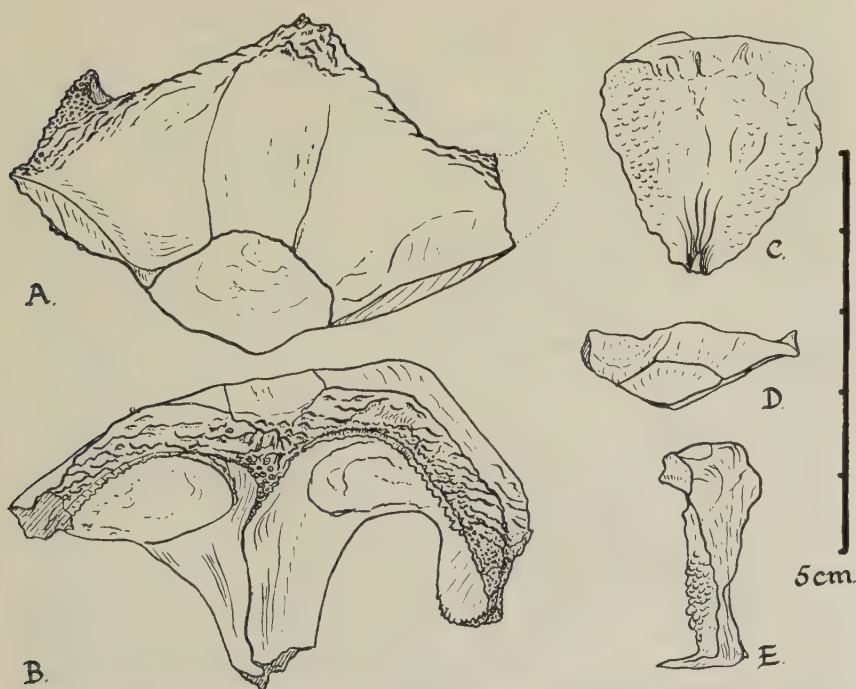


FIG. 4. *Encephalartos bubalinus* Melville. Median scale of the female cone: A, adaxial face of bulla; B, adaxial view of the scale. Median scale of male cone, C, adaxial face; D, distal end showing adaxial face of bulla, abaxial face almost completely hidden; E, lateral view.

Trunk to 137 cm. high and 33 cm. diameter, erect or prostrate. Scale leaves on female:—triangular to ovate acuminate 10–14 cm. long, 40–45 mm. wide, keeled 10–15 mm. thick, abaxial face densely buff-felted, adaxial smooth, brown; on male:—linear- to lanceolate-acuminate, 6–12 cm. long, 6–20 mm. wide, \pm flat to keeled. Leaves oblanceolate 60–165 cm. long, 20–30 cm. wide, with 50–90 leaflet pairs, apex rounded, tapering gradually to the base, rachis \pm keeled above, deeply rounded

below, with decurrent ridges between the leaflets, sparingly whitish tomentose, swollen petiole base densely buff-brown felted. *Median leaflets* linear, rigid, coriaceous, 10–20 cm. long, 11–20 mm. wide, apex gradually or abruptly pungent, straight or forwardly arched, upper margin with 2–4 forwardly directed spiny teeth above, near the base and 0–1 on the lower margin, base abruptly tapered to the decurrent basal attachment 10–13 mm. long, lower surface obscurely striate with 24–35 parallel nerves; lower leaflets passing from lanceolate to ovate with small spiny teeth, to small trifurcate or simple lanceolate and cuneate spines terminating at the swollen petiole base. *Male cones* ellipsoid to sub-cylindrical, 11–22 cm. long, 5.5–6.0 cm. diameter, apex and base rounded, peduncle smooth, about 1.5–2 cm. diameter; *median cone scales* spreading, limb broad cuneate, 23–30 mm. long, 20–25 mm. wide, *bulla* deflexed, \pm flattened, subtriangular to rhomboid, 20–25 mm. wide, 7–15 mm. deep; adaxial face with 2 trapezoidal lateral facets separated by 2 slightly raised latero-sagittal ridges enclosing a rectangular or triangular median facet 2–6 mm. wide; surface uniform; adaxial margin rounded; terminal facet, rhomboid to hexagonal or pentagonal, $\frac{1}{2}$ – $\frac{2}{3}$ as wide and as deep as the bulla; lateral ridges acute, straight or arching; abaxial surface hidden, subcrescentic with a sagittal ridge 4–8 mm. long or with 2 slightly raised latero-sagittal ridges and a rectangular or triangular median facet; lower surface with sporangia extending to the margins. *Female cones* not seen. *Bulla* of median scales deflexed, rhomboid, about 6 cm. wide and 3–6 cm. deep, *adaxial face* with 2 trapezoidal lateral facets and a rectangular median facet 8–12 mm. wide, between 2 indistinct latero-sagittal ridges; surface uniform, passing at the adaxial margin into low ridges or to higher acute ridges at the median angle; sagittal crest of \pm terete umbilicate tubercles; seminal fringes irregularly dentate, of flattened tubercles; *terminal facet* rhomboid to hexagonal, about 20–26 mm. wide and 10–14 mm. deep, lateral ridges subacute, straight to arching; *abaxial face* partly exposed, subcrescentic, with 2 indistinct \pm diverging latero-sagittal ridges about 9–12 mm. apart; surface uniform passing at the inner margin into a series of subacute \pm parallel step-like ridges and at the median angle into a sagittal crest with short umbilicate tubercles or warts; seminal ridge of compressed tubercles; *lateral lobes* subtriangular to irregular or flattened, about 10–13 mm. long, outer facets with small, usually umbilicate, tubercles or warts, passing to parallel ridges at the base, angles tuberculate dentate; *pedicel* sharply quadrangular, adaxial and abaxial angles \pm tuberculate dentate below the sagittal crests. *Seeds* ellipsoid to broadly ovoid, 34–42 mm. long, 21–26 m. diameter or 30×30 mm.

This species was discovered by Mr. P. R. O. Bally on September 17, 1944 between Loliondo and the northern end of Lake Natron in Tanganyika, about 7 miles from the Kenya border, near a place called Gwara on the maps. Today, the name "Gwara" seems unknown to the Wasonjo, the local tribe, who call the place Moluvane. The material then obtained (Bally 3829) included a male cone and leaf specimens, which appeared to represent an unknown species. Following a request for further material with female cones, Mr. Bally again visited the area on July 5th, 1956, but unfortunately found only very old male cones and no trace of female cones. The plants did not flower in 1956 and all that

could be discovered of the female cones was a few isolated cones scales and broken seed shells, the remnants left by baboons from some previous coning. In addition to the specimen (Bally 10600), monochrome and colour photographs were obtained of the plants and their habitat, for all of which I am much indebted to Mr. Bally. Two adults and four seedlings were taken back to Nairobi to attempt their cultivation.

By questioning the local natives, it was ascertained that the area of distribution of the plant extends for about 15 miles between Loliondo and Loiyogaz on the west and Ol Doinyo Sambu on the east. This country of the Nguruman Hills consists of a series of quartzite hills with an altitude of 4000–5000 ft. Associated with the *Encephalartos* were species of *Acacia*, *Ziziphus*, *Dombeya*, *Dolichos* and *Aloe volkensii* and grasses in open bushland. The epithet *bubalinus* refers to the closely felted indumentum of the scale leaves and leaf bases which has the appearance of buff suède leather.

8. **E. gratus** Prain in Kew Bull., 1916, 181 (1916) et Fl. Trop. Afr., 6 (2), 352 (1917); Schuster, Pflanzenreich 4 (1), 121 (1932). Type : Nyasaland, Mt. Mlanji, Davy 417 (K. lecto. !).

Trunk globose or up to 120 cm. high and 60 cm. diameter, covered with leaf bases and scale leaves clothed in floccose tomentum. *Scale leaves* triangular, long acuminate, 8–12 cm. long and 3–4 cm. wide at the base, midrib keeled on the abaxial face and with a low ridge on adaxial face, apex with abortive leaflets, grey-buff to brown-buff tomentose except for the smooth brown base on the adaxial side. *Leaves* oblanceolate to linear oblong, 90–180 cm. long, 34–44 cm. wide with 30–70 pairs of leaflets, apex rounded, base abruptly tapered, rachis subterete, smooth or with decurrent ridges from the leaflet bases, swollen petiole base with a close brownish-buff tomentum. *Median leaflets* lanceolate acuminate, 18–26 cm. long, 23–35 mm. wide, dull green, rigid, coriaceous, apex pungent, straight or arching forward, base rounded or broad cuneate above, cuneate below, anterior margin with $2-7 \pm$ divaricate spiny teeth, often 3–4 on the basal curve, lower margin with 0–6 spiny teeth, lower surface indistinctly striate with 30–48 parallel nerves, basal attachment 4–7 mm. wide, 1–2 pairs of lower leaflets subpalmate, divaricately spiny, 1.5–2.5 cm. long, passing to trifurcate and finally simple spines terminating 6–18 cm. above the swollen base. *Male cones* narrowly ovate to cylindrical, 10–40 cm. long, 4.5–10.0 cm. diameter, greenish yellow, finally reddish brown or dull brown, peduncle 3.5–19.0 cm. long, 1–3 cm. diameter; lamina of *median scales* lyrate to oblong, tapering to the base, 18–32 mm. long, 13–22 mm. wide, margins convex, contracted below the bulla or straight; *bulla* deflexed, rhomboid to subtriangular, 13–20 mm. wide, 7–10 mm. deep, puberulent; adaxial face of 2 trapezoidal facets separated by a sagittal ridge; terminal facet rhomboid to nearly semi-circular, 6–10 mm. wide, 3–5 mm. deep, about $\frac{1}{3}-\frac{1}{2}$ as wide and as deep as the bulla; lateral ridges acute, straight or concave, lower margin of bulla formed by the medio-lateral ridge; abaxial face receding, about 5–6 mm. deep in the centre, with a prominent, blunt sagittal ridge separating 2 subtriangular facets. *Female cones*, cylindrical to subconical, 55–68 cm. long, 15–20 cm. diameter, greenish yellow, finally brown, peduncle 10–14 cm. long, 6–7 cm. diameter. *Bulla of median scales* deflexed, 4.6–5.7 cm. wide, 22–37 mm. deep; *adaxial face* of 2 flat trapezoidal

facets with an obtuse sagittal ridge, sometimes bifurcate in the abaxial $\frac{1}{2}$ – $\frac{1}{4}$; surface puberulent, \pm uniform passing at the rounded adaxial margin to low, irregular verrucose ridges and tubercles; seminal fringes of flattened ridges and tubercles; lateral ridges acute, straight to slightly convex; *terminal facet* rhomboid to compressed pentagonal or suborbicular, 7–18 mm. wide, 6–10 mm. deep, flat to concave; *abaxial face* sub-crescentic, receding with an obtuse or rounded sagittal ridge; surface uniform passing at the inner margin to low verrucose ridges, irregular warts and laterally to small irregular warts or blunt irregular plicate folds; sagittal crest of larger, subconical warts and seminal ridge of compressed warts and short dactyloid tubercles; *lateral lobes* 9–15 mm. long, triangular with acute \pm irregular blunt-dentate angles and outer facets with small warts or low verrucose ridges; *median lobe*, adaxial, 4–12 mm. long, triangular to irregularly quadrangular, similar to lateral lobes; *pedicel* quadrangular, 2.5–3.0 cm. long, with acute angles sometimes sparingly tuberculate-dentate at the distal end. *Seeds* angular ellipsoid, blunt, 30–40 mm. long, 14–20 mm. diameter, cinnabar red, attachment scar, semioval to semicircular, 11–14 mm. long, 7–8 mm. wide.

Distribution : Nyasaland, Mount Mlanje.

9. **E. manikensis** (Gilliland) Gilliland in Trans. Rhodes, Sci. Ass., **37**, 133 (1939). Type : Southern Rhodesia, Mt. Gorongowe, Gilliland 2016, July 1937. (B.M. holo. !).

Syn. *E. gratus* Prain var. *manikensis* Gilliland, in J.S. Afr. Bot. **4**, 153 (1938).

Trunk to 1.5 m. high and 30 cm. diameter. *Scale leaves* triangular acuminate, with tip inrolled, 2.0–2.5 cm. wide at the base, 6+ cm. long, externally with dense fawn woolly tomentum, internally, smooth, brown. *Leaves* linear-oblong, 1–2 m. long, 22–34 cm. wide, apex rounded, tapering rather abruptly to the base, with about 60 pairs of leaflets, rachis smooth or with decurrent ridges from the leaflet bases, swollen petiole bases, covered with a pale fawn floccose tomentum. *Median leaflets* lanceolate to linear lanceolate, acuminate, \pm arcuate to the spiny tip, 12–18 cm. long, 20–33 mm. wide, margin with 2–4 divaricate spiny teeth towards the base on each side, lower surface \pm distinctly striate with 30–45 parallel nerves; *lower leaflets* lanceolate to ovate, 5–2 cm. long with large divaricate spiny teeth, passing to spiny palmate, 5–3–2 furcate leaflets 2–1 cm. long and to lanceolate and finally awl shaped spines terminating 5–10 cm. above the swollen petiole base. *Male cones* subconical 22–60 cm. long, 7–10 cm. diameter about $\frac{1}{3}$ above the base, apex \pm rounded, base truncate, peduncle 13–15 cm. long, 3.5–5.0 cm. diameter, floccose tomentose, with a few ovate-triangular bracts. *Median cone scales* spreading \pm horizontally, 30–35 mm. long, 33–50 mm. wide, limb subrectangular, with cordate base, flat above but sharply upturned to the centre of the bulla, forming a recess; densely covered with sporangia below except for a marginal band 2–3 mm. wide; *bulla* rhomboid, deflexed 30–50 mm. wide, 16–25 mm. deep; adaxial face smooth, with a well defined sagittal ridge; adaxial margin rounded; terminal facet rhomboid 16–20 mm. wide, 10–13 mm. deep; lateral ridges acute; abaxial face receding, \pm crescentic smooth with an obtuse sagittal ridge.

Female cones cylindrical 32–53 cm. long, 14–18 cm. diameter, apex rounded, base truncate, peduncle 6–9 cm. long, 4.5 cm. diameter floccose tomentose : *bullae of median scales* deflexed, rhomboid, 40–50 mm. wide, 22–30 mm. deep ; *adaxial face* with 2 latero-sagittal ridges 4–8 mm. apart, enclosing a rectangular or triangular median facet, or a single sagittal ridge ; surface uniform, passing at the adaxial margin to irregular, compressed, plicate ridges and compressed tubercles, increasing in height to the seminal fringe of compressed tubercles and to the prominent, triangular sagittal crest ; lateral ridges acute, arched or straight, joining the terminal facet in its middle or upper $\frac{1}{3}$, *terminal facet* polygonal to compressed hexagonal, 10–16 mm. wide, 8–12 mm. deep ; *abaxial face* receding, subcrenate, passing inwards to irregular compressed ridges and strongly compressed tubercles along the seminal ridge ; pedicel quadrangular, 23–28 mm. long. *Seeds* broadly ellipsoid to ovoid-ellipsoid, truncate, 29–36 mm. long, 18–25 mm. diameter, scarlet, attachment scar broadly semiovate to rounded-triangular or elliptic, 13–15 mm. long, 9–11 mm. wide.

Distribution : Southern Rhodesia : Mt. Gorongowe ; Belingwe ; Portuguese East Africa : Chimanimaní Mountains ; Bandula ; Mt. Garuzo.

Several names have been employed by Mr. B. Christian in manuscripts and on herbarium sheets to *Encephalartos* collections from localities in Portuguese East Africa. None of these collections is "complete" in the sense of the notes on collecting given in this paper, even when taken from cultivated plants at Ewanrigg. On the evidence available, there does not appear to be more than one species in this area. Some confusion is likely to be caused by distorted female cone scales, that appear to have been attacked and galled either by an insect or a fungus. More complete collections are highly desirable, but it is often difficult to obtain female cones owing to the depredations of baboons.

Your New Garden.*—This is the third edition of a book first published in 1935. It has been entirely revised by A. G. L. Hellyer, editor of "Amateur Gardening", who with his wide experience of horticulture and his undoubted knowledge of the difficulties that befall the amateur gardener, is fully qualified to give advice on the subject. Into this book he has compressed a great deal of information. The purpose of the book is to present a plan for all those who wish to make new gardens. The chapters are grouped into three parts, part 1 deals with the first year's work, part 2 with the second year, and part 3 with the third. Thus we have a schedule of work spread over a period of three years which should enable those who follow it to develop a garden where none existed before. The numerous operations involved in making such a garden are described in simple language and many are illustrated by excellent photographic illustrations.

H. S. MARSHALL.

* *Your New Garden*. By A. G. L. Hellyer. London : W. H. & L. Collingridge Ltd., New York : Transatlantic Arts Inc. ed. 3 (rev.) 1957. Pp. 256. Illus. photographs and line drawings.

Gardening Books

The following books have recently been published by W. H. & L. Collingridge Ltd. :—

- (1) **Raspberries and Loganberries.**—This little book describes the cultivation of these popular fruits. It contains useful information for the keen grower, and deals with cane fruits and their uses, the preparation of the ground, fertilizers, pruning, bird protection, propagation, control of pests, harvesting, preserving, exhibiting, and concludes with a description of recommended varieties. The various operations are illustrated by line drawings.
- (2) **Lilies.**—A clearly written handbook giving sound advice on the cultivation of these lovely plants. It deals with bulbs, flowers and leaves, soils, planting, routine culture, lilies in tubs and in the greenhouse, pests and diseases, propagation, and includes a descriptive list of lilies. Illustrated by line drawings.
- (3) **Border Carnations.**—Describes the culture of these popular flowers, giving information on the different kinds of carnations, the importance of healthy stock, growing carnations in the garden, in the greenhouse and in pots, watering, propagation, pests and diseases, exhibiting, and includes chapters on the cultivation of pinks. A descriptive list of recommended varieties is given in the last chapter. Illustrated by line drawings.
- (4) **Bulbs.**—A handy little book packed with information on many bulbous plants available for cultivation in gardens to-day. The author has included also plants having corms and others with tuberous roots. All aspects of bulb cultivation are dealt with both in and out of doors, their propagation, pests and diseases, followed by a descriptive list of bulbs. The book is illustrated by a number of line drawings.
- (5) **Indoor Plants.**—This little book forms No. 8 in the "Amateur Gardening Picture Book" series and deals with the cultivation of house plants. It is illustrated by over 160 photographs and drawings.
- (6) **In the Flower Garden.**—A practical month by month guide which should be of value to all those who have an interest in the running of a garden. The author who is well known to viewers of the B.B.C.'s Television feature "Gardening Club", is a professional gardener of wide experience and in his book he imparts a great deal of information and good advice. The book is well illustrated with excellent photographs and provide with a useful index.

H. S. MARSHALL.

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- (1) Raspberries and Loganberries. "Amateur Gardening" Handbook no. 20. By Hilary M. Hughes. Pp. 92. 18 line drawings. 4/-. 1957.
 - (2) Lilies. "Amateur Gardening" Handbook no. 21. By J. G. Campbell. Pp. 92. 15 line drawings. 4/-. 1957.
 - (3) Border Carnations. "Amateur Gardening" Handbook no. 25. By J. H. W. Galbally. Pp. 92. 18 line drawings. 4/-. 1957.
 - (4) Bulbs. "Amateur Gardening" Handbook no. 26. By J. P. Wood. Pp. 92. 19 line drawings. 4/-. 1957.
 - (5) Indoor Plants. "Amateur Gardening" Picture Book no. 8. By A. J. Huxley. Pp. 60. 160 photographs and drawings. 7/6. 1957.
 - (6) In the Flower Garden with Percy Thrower of Television Gardening Club. Pp. 96. Over 70 photographic illustrations. 7/6. 1957.

NOTES ON ASIATIC ORCHIDS: II.*

V. S. SUMMERHAYES

Gymnadenia graminifolia (Rchb. f.) Rchb. f. in Bot. Zeit. **36**, 75 (1878).

Ponerorchis graminifolia Rchb. f. in Linnaea, **25**, 228 (1852) et Xen. Orch. **1**, 20, t. 8, fig. IV 18-21 (1854).

Gymnadenia rupestris Miq. Prolus. Fl. Jap. 138 (1866-67).

Platanthera rupestris (Miq.) Schltr. ex Matsum. Ind. Pl. Jap. **2**, 261 (1905).

Orchis rupestris (Miq.) Schltr. in Fedde, Repert. Spec. Nov. Beih. **4**, 90 (1919).

O. graminifolia (Rchb. f.) Tang & Wang in Bull. Fan Mem. Inst. Biol. Bot. Ser. **10**, 25 (1940).

Schlechter and Tang & Wang on two different occasions transferred the above species from *Gymnadenia* to *Orchis* and this view has been followed by Ohwi in his recently published Flora of Japan.

Examination of material in spirit, however, shows that the viscidia are quite naked, there being no bursicles as invariably in the genus *Orchis*, while the viscidia themselves are linear and placed in a parallel position as in *Gymnadenia*. Vermeulen also could find no bursicles when examining dried material in the Kew Herbarium.

It seems, therefore, that the species is correctly placed in the genus *Gymnadenia*, not in *Orchis*, and this is borne out by the general structure of the flower. So far as I can see from the material available the tubers are elongate, cylindrical or ovoid and possibly shortly lobed; I have not seen any that are spherical, as illustrated and described by Reichenbach. Tang and Wang state that the type specimen of *G. graminifolia* in the Reichenbach Herbarium lacks any tubers so it is not clear from what source Reichenbach obtained his information.

EPIGENEUM Gagnep.

In 1853 Lindley (Lindl. & Paxt. Fl. Garden, **1**, 136, 155) proposed the name *Sarcopodium* for a group of orchids. Some of these are now by common consent included in the genus *Bulbophyllum*, while the remainder have been treated by many authors as a section of *Dendrobium*. Rolfe and Kraenzlin, however, both considered that this latter part, which contained Lindley's type species (*S. amplum* (Lindl.) Lindl.) should be maintained as a genus distinct from *Dendrobium*, a view with which the present writer concurs.

In a recent paper in Lloydia (**19**, 94-98 : 1956) A. D. Hawkes pointed out that the name *Sarcopodium* Lindl. is a later homonym of *Sarcopodium* Ehrenb. ex Schlechtend., a genus of *Fungi*. He therefore proposed the new name *Katherinea* for the orchid genus, as emended by Kraenzlin and Rolfe, which he also maintained as distinct from *Dendrobium*, and he made a number of new combinations for the various species which he recognised.

* Continued from K.B. 1955, 589.

Unfortunately Hawkes overlooked recent papers by Tang and Wang (Acta Phytotax. **1**, 83, 262–263 : 1951) in which they reduced Gagnepain's genus *Epigeneium*, based on *Dendrobium fargesii* Finet and including several other species, to *Sarcopodium* Lindl. I have examined *D. fargesii* and I agree with Tang and Wang that it is referable to *Sarcopodium* Lindl. as emended by Rolfe and Kraenzlin and renamed by A. D. Hawkes in the above mentioned paper. The name *Epigeneium* must therefore be adopted for the genus instead of *Sarcopodium* or the new name *Katherinea*, the type species, however, now being *E. fargesii* (Finet) Gagnep. instead of *S. amplum* (Lindl.) Lindl. as previously.

I agree with Hawkes that the group is most conveniently kept separate from *Dendrobium* on account of the distinct habit and general floral structure. I am therefore making the necessary combinations under *Epigeneium* for all the species which I consider to be referable to the genus and distinct from one another. Several species which have at one time or another been referred to *Sarcopodium*, either when considered as a distinct genus or as a section of *Dendrobium*, prove on examination to belong to other genera and these excluded species are listed at the end. In the synonymy only the original place of publication of each name is given. The geographical distribution of each species is given as accurately as possible but there may well be omissions.

ENUMERATION OF SPECIES

1. ***Epigeneium acuminatum*** (Rolfe) Summerhayes, comb. nov.

Dendrobium acuminatum Rolfe in Ames, Orchid. **1**, 86 (1905).

Sarcopodium acuminatum (Rolfe) Kraenzl. in Fedde, Repert. Spec. Nov. **7**, 41 (1909), in obs.

Katherinea acuminata (Rolfe) A. D. Hawkes in Lloydia, **19**, 94 (1956), excl. var. *lyonii*.

Distrib. : Philippines.

I consider the plant referred to by Kraenzlin in his monograph of the genus to this species as var. *lyonii* to be a distinct species which is dealt with later on as *E. lyonii* (Ames) Summerh.

2. ***E. amplum*** (Lindl.) Summerhayes, comb. nov.

Dendrobium amplum Lindl. ex Wall. Pl. As. Rar. 25, t. 29 (1829).

Sarcopodium amplum (Lindl.) Lindl. Fol. Orch. Sarcopod. 1 (1853).

Bulbophyllum amplum (Lindl.) Rehb. f. in Walp. Ann. **6**, 244 (1861).

Katherinea ampla (Lindl.) A. D. Hawkes in Lloydia, **19**, 95 (1956).

Distrib. : India.

3. ***E. cacuminis*** (Gagnep.) Summerhayes, comb. nov.

Dendrobium cacuminis Gagnep. in Bull. Mus. Hist. Nat. Paris, sér. 2, **2**, 233 (1930).

Sarcopodium cacuminis (Gagnep.) Tang & Wang in Acta Phytotax. **1**, 82 (1951).

Distrib. : Indo-China.

4. **E. chapaense** Gagnep. in Bull. Mus. Hist. Nat. Paris, sér. 2, **4**, 596 (1932).

Sarcopodium chapaense (Gagnep.) Tang & Wang in Acta Phytotax. **1**, 83, 263 (1951).

Distrib. : Indo-China.

5. **E. clemensiae** Gagnep. in Bull. Mus. Hist. Nat. Paris, sér. 2, **4**, 595 (1932).

E. delacourii Gagnep. l.c. (1932).

Sarcopodium clemensiae (Gagnep.) Tang & Wang in Act. Phytotax. **1**, 83, 263 (1951).

Distrib. : Indo-China.

I accept Tang & Wang's view that the above two concepts are conspecific, as they have seen the type specimens at Paris.

6. **E. coelogyne** (Rchb. f.) Summerhayes, comb. nov.

Dendrobium coelogyne Rchb. f. in Gard. Chron. **1871**, 136.

Sarcopodium coelogyne (Rchb. f.) Rolfe in Orch. Rev. **18**, 238 (1910).

Katherinea coelogyne (Rchb. f.) A. D. Hawkes in Lloydia, **19**, 95 (1956).

Distrib. : Burma, Thailand.

7. **E. cymbidioides** (Bl.) Summerhayes, comb. nov.

Desmotrichum cymbidioides Bl. Bijdr. 332 (1825).

Dendrobium cymbidioides (Bl.) Lindl. Gen. & Sp. Orch. Pl. 77 (1830).

D. marginatum Teysm. & Binn. in Tijdschr. Ned. Ind. **5**, 490 (1853).

Callista cymbidioides (Bl.) Kuntze, Rev. Gen. Pl. 653 (1891).

Sarcopodium cymbidioides (Bl.) Rolfe in Orch. Rev. **18**, 238 (1910).

Katherinea cymbidioides (Bl.) A. D. Hawkes in Lloydia, **19**, 95 (1956).

Distrib. : Sumatra, Java.

Following Rolfe I take the view that *Desmotrichum triflorum* Bl. is distinct from *D. cymbidioides* Bl. and the former species is therefore dealt with separately later on in this account.

8. **E. dempoense** (J. J. Sm.) Summerhayes, comb. nov.

Dendrobium dempoense J. J. Sm. in Bull. Jard. Bot. Buitenz. sér. 3, **2**, 67 (1920).

Sarcopodium dempoense (J. J. Sm.) Carr in Journ. As. Soc. Malaya, **11**, 87 (1933).

Distrib. : Sumatra.

9. **E. elongatum** (Bl.) Summerhayes, comb. nov.

Desmotrichum elongatum Bl. Bijdr. 332 (1825).

Dendrobium elongatum (Bl.) Lindl. Gen. & Sp. Orch. Pl. 77 (1830).

Sarcopodium elongatum (Bl.) Rolfe in Orch. Rev. **18**, 239 (1910).

Katherinea elongata (Bl.) A. D. Hawkes in Lloydia, **19**, 95 (1956).

Distrib. : Java.

10. **E. fargesii** (Finet) Gagnep. in Bull. Mus. Hist. Nat. Paris, sér. 2, **4**, 595 (1932), in clavi.

Dendrobium fargesii Finet in Bull. Soc. Bot. Fr. **50**, 374 (1903).

Desmotrichum fargesii (Finet) Kraenzl. in Engl. Pflanzenr. Orch.-Dendrob. **1**, 358 (1910).

Sarcopodium fargesii (Finet) Tang & Wang in Act. Phytotax. **1**, 83 (1951).

Distrib. : China (Szechuan).

This is the type species of the genus, as is clearly indicated by Gagnepain in his original description. It is a sort of small edition of *E. amplum* (Lindl.) Summerh., with the same creeping habit but much smaller in all its parts.

11. **E. fuscescens** (Griff.) Summerhayes, comb. nov.

Dendrobium fuscescens Griff. Notul. **3**, 308 (1851) et Ic. Pl. Asiat. t.309 (1851).

Sarcopodium fuscescens (Griff.) Lindl. Fol. Orch. Sarcopod. 2 (1853).

Bulbophyllum fuscescens (Griff.) Rchb. f. in Walp. Ann. **6**, 244 (1861).

Katherinea fuscescens (Griff.) A. D. Hawkes in Lloydia, **19**, 95 (1956).

Distrib. : China, India.

12. **E. geminatum** (Bl.) Summerhayes, comb. nov.

Desmotrichum geminatum Bl. Bijdr. 332 (1825).

Dendrobium geminatum (Bl.) Lindl. Gen. & Sp. Orch. Pl. 77 (1830).

Sarcopodium geminatum (Bl.) Rolfe in Orch. Rev. **18**, 238 (1910).

Katherinea geminata (Bl.) A. D. Hawkes in Lloydia, **19**, 96 (1956).

Distrib. : Malay Peninsula, Java.

13. **E. kinabaluense** (Ridl.) Summerhayes, comb. nov.

Dendrobium kinabaluense Ridl. apud Stapf in Trans. Linn. Soc. Lond. ser. 2, Bot. **4**, 234 (1894).

Sarcopodium kinabaluense (Ridl.) Rolfe in Orch. Rev. **18**, 239 (1910).

Katherinea kinabaluense (Ridl.) A. D. Hawkes in Lloydia, **19**, 96 (1956).

Distrib. : Borneo.

14. **E. labuanum** (Lindl.) Summerhayes, comb. nov.

Dendrobium labuanum Lindl. in Journ. Linn. Soc. Lond. Bot. **3**, 6 (1858).

Sarcopodium labuanum (Lindl.) Rolfe in Orch. Rev. **18**, 239 (1910).

Katherinea labuana (Lindl.) A. D. Hawkes in Lloydia, **19**, 96 (1956).

Distrib. : Borneo.

15. **E. laurifolium** (Kraenzl.) Summerhayes, comb. nov.
Sarcopodium laurifolium Kraenzl. in Engl. Pflanzenr. Orch.-Dendrob. **1**, 328 (1910).
Dendrobium laurifolium (Kraenzl.) J. J. Sm. in Fedde, Repert. Spec. Nov. **32**, 286 (1933).
Katherinea laurifolia (Kraenzl.) A. D. Hawkes in Lloydia, **19**, 96 (1956).
 Distrib. : Sumatra.
16. **E. longipes** (Hook. f.) Summerhayes, comb. nov.
Dendrobium longipes Hook. f. Fl. Brit. Ind. **5**, 713 (1890).
Sarcopodium longipes (Hook. f.) Rolfe in Orch. Rev. **18**, 238 (1910).
Katherinea longipes (Hook. f.) A. D. Hawkes in Lloydia, **19**, 96 (1956).
 Distrib. : Malay Peninsula.
17. **E. lyonii** (Ames) Summerhayes, comb. nov.
Dendrobium lyonii Ames, Orchid. **2**, 177 (1908).
Sarcopodium lyonii (Ames) Rolfe in Orch. Rev. **18**, 240 (1910).
S. acuminatum var. *lyonii* (Ames) Kraenzl. in Engl. Pflanzenr. Orch.-Dendrob. **1**, 329 (1910).
Katherinea acuminata var. *lyonii* (Ames) A. D. Hawkes in Lloydia, **19**, 94 (1956).
 Distrib. : Philippines.
 As I have already indicated earlier under *E. acuminatum* Rolfe, the present species is clearly distinct from Rolfe's species, differing not only in the size, colour and structure of the flower and in minor vegetative features but also in occupying a different altitudinal zone in the mountains of Luzon. So far as I am aware *E. acuminatum* has never been in cultivation and all cultivated plants recorded under the name *Dendrobium acuminatum* are really *E. lyonii*.
18. **E. macropodum** (Hook. f.) Summerhayes, comb. nov.
Dendrobium macropodum Hook. f. Fl. Brit. Ind. **5**, 713 (1890).
Sarcopodium macropodum (Hook. f.) Rolfe in Orch. Rev. **18**, 238 (1910).
Katherinea macropoda (Hook. f.) A. D. Hawkes in Lloydia, **19**, 96 (1956).
 Distrib. : Malay Peninsula, Sumatra, Java.
19. **E. nakaharaei** (Schltr.) Summerhayes, comb. nov.
Dendrobium nakaharaei Schltr. in Fedde, Repert. Spec. Nov. **2**, 169 (1906).
 Distrib. : Formosa.

20. **E. pulchellum** (Ridl.) Summerhayes, comb. nov.
Sarcopodium pulchellum Ridl. in Journ. Fed. Malay States Mus. **8** (4), 93 (1917).
Dendrobium brevisulbum J. J. Sm. in Bull. Jard. Bot. Buitenz. sér. 3, **10**, 62 (1928).
Katherinea pulchella (Ridl.) A. D. Hawkes in Lloydia, **19**, 97 (1956).
 Distrib. : Sumatra.

21. **E. quinquecallosum** (J. J. Sm.) Summerhayes, comb. nov.
Dendrobium quinquecallosum J. J. Sm. in Bull. Jard. Bot. Buitenz. sér. 3, **2**, 68 (1920).
 Distrib. : Sumatra.

22. **E. radicosum** (Ridl.) Summerhayes, comb. nov.
Dendrobium radicosum Ridl. in Journ. Roy. As. Soc. Straits, **49**, 29 (1908).
Sarcopodium radicosum (Ridl.) Rolfe in Orch. Rev. **18**, 239 (1910).
 Distrib. : Borneo.

23. **E. rotundatum** (Lindl.) Summerhayes, comb. nov.
Sarcopodium rotundatum Lindl. Fol. Orch. Sarcopod. 2 (1853).
Bulbophyllum rotundatum (Lindl.) Rchb. f. in Walp. Ann. **6**, 244 (1861).
Dendrobium rotundatum (Lindl.) Hook. f. Fl. Brit. Ind. **5**, 712 (1890).
Katherinea rotundata (Lindl.) A. D. Hawkes in Lloydia, **19**, 97 (1956).
 Distrib. : China, India.

24. **E. sanseiense** (Hayata) Summerhayes, comb. nov.
Dendrobium sanseiense Hayata, Ic. Pl. Formos. **6**, 70 (1916).
 Distrib. : Formosa.

25. **E. simplex** (J. J. Sm.) Summerhayes, comb. nov.
Dendrobium simplex J. J. Sm. in Bull. Jard. Bot. Buitenz. sér. 2, **2**, 8 (1911).
Katherinea simplex (J. J. Sm.) A. D. Hawkes in Lloydia, **19**, 97 (1956).
 Distrib. : New Guinea.

26. **E. speculum** (J. J. Sm.) Summerhayes, comb. nov.
Dendrobium speculum J. J. Sm. in Bull. Dép. Agric. Ind. Néerl. **5**, 34 (1907).
Sarcopodium speculum (J. J. Sm.) Carr in Gard. Bull. Straits Settlem. **8**, 109 (1935).
Katherinea speculum (J. J. Sm.) A. D. Hawkes in Lloydia **19**, 97 (1956), sphalm. *specula*.
 Distrib. : Borneo.

27. **E. stella-silvae** (Loher & Kraenzl.) Summerhayes, comb. nov.
Sarcopodium stella-silvae Loher & Kraenzl. in Fedde, Repert. Spec. Nov. **7**, 40 (1909).
Dendrobium stella-silvae (Loher & Kraenzl.) Ames, Orchid. **5**, 139 (1915).
Katherinea stella-silvae (Loher & Kraenzl.) A. D. Hawkes in Lloydia, **19**, 97 (1956).
 Distrib. : Philippines.
28. **E. suberectum** (Ridl.) Summerhayes, comb. nov.
Sarcopodium suberectum Ridl. in Kew Bull. **1914**, 211 (1914).
 Distrib. : Borneo.
29. **E. treacherianum** (Rchb. f. ex Hook. f.) Summerhayes, comb. nov.
Dendrobium treacherianum Rchb. f. ex Hook. f. in Curt. Bot. Mag. **107**, t. 6591 (1881).
Sarcopodium treacherianum (Rchb. f. ex Hook. f.) Rolfe in Orch. Rev. **18**, 239 (1910).
Katherinea treacheriana (Rchb. f. ex Hook. f.) A. D. Hawkes in Lloydia, **19**, 97 (1956).
 Distrib. : Borneo.
30. **E. triadenium** (Lindl.) Summerhayes, comb. nov.
Sarcopodium triadenium Lindl. Fol. Orch. Sarcopod. 2 (1853).
Bulbophyllum triadenium (Lindl.) Rchb. f. in Walp. Ann. **6**, 257 (1861).
Phyllorchis triadenia (Lindl.) Kuntze, Rev. Gen. Pl. 678 (1891).
 Distrib. : ? Java.
31. **E. triflorum** (Bl.) Summerhayes, comb. nov.
Desmotrichum triflorum Bl. Bijdr. 331 (1825).
Dendrobium triflorum (Bl.) Lindl. Gen. & Sp. Orch. Pl. 77 (1830).
Sarcopodium triflorum (Bl.) Rolfe in Orch. Rev. **18**, 239 (1910).
 Distrib. : Java.
 I am in agreement with Rolfe in considering this species to be distinct from *E. cymbidioides* (Bl.) Summerh. Both have been in cultivation for many years and maintain their distinct characters.
32. **E. uncipes** (J. J. Sm.) Summerhayes, comb. nov.
Dendrobium uncipes J. J. Sm. in Bull. Jard. Bot. Buitenz. sér. 2, **3**, 72 (1912).
Katherinea uncipes (J. J. Sm.) A. D. Hawkes in Lloydia, **19**, 98 (1956).
 Distrib. : New Guinea.

33. **E. verruciferum** (Rolfe) Summerhayes, comb. nov.

Dendrobium verruciferum J. J. Sm. in Bull. Dép. Agric. Ind. Néerl. **15**, 12 (1908), non Rchb. f.

Sarcopodium verruciferum Rolfe in Orch. Rev. **18**, 239 (1910).

Dendrobium interruptum J. J. Sm. in Bull. Dép. Agric. Ind. Néerl. **45**, 18 (1911).

Sarcopodium interruptum (J. J. Sm.) Merr. in Journ. As. Soc. Straits, Spec. Vol. 167 (1921).

Katherinea interrupta (J. J. Sm.) A. D. Hawkes in Lloydia **19**, 96 (1956).

K. verrucifera (Rolfe) A. D. Hawkes, l.c. 98 (1956).

Distrib. : Borneo.

When J. J. Smith described *Dendrobium verruciferum* in 1908 he was apparently unaware that the younger Reichenbach had already applied this name to quite a different species. Smith remedied this by renaming his species *D. interruptum* in 1911. Meanwhile, however, Rolfe had transferred Smith's *D. verruciferum* to *Sarcopodium*, using Smith's epithet. As this was a perfectly legitimate epithet in the genus *Sarcopodium* when published it must be accepted in that genus and also as a basonym for any subsequent transferences, though for priority it dates from 1910 only and not from 1908. It is nevertheless earlier than Smith's epithet *interruptum* which was not proposed until a year later.

34. **E. wichersii** (Schltr.) Summerhayes, comb. nov.

Dendrobium wichersii Schltr. in Fedde, Repert. Spec. Nov. **8**, 506 (1910).

Sarcopodium wichersii (Schltr.) Carr in Journ. As. Soc. Malaya, **11**, 87 (1933), in obs.

Katherinea wichersii (Schltr.) A. D. Hawkes in Lloydia, **19**, 98 (1956).

Distrib. : Sumatra.

35. **E. zebrinum** (J. J. Sm.) Summerhayes, comb. nov.

Dendrobium zebrinum J. J. Sm. Icon. Bogor. **2**, 72, t. 113C (1903).

D. sulphuratum Ridl. in Journ. Roy. As. Soc. Straits, **49**, 28 (1908).

Sarcopodium sulphuratum (Ridl.) Rolfe in Orch. Rev. **18**, 239 (1910).

S. zebrinum (J. J. Sm.) Kraenzl. in Engl. Pflanzenr. Orch.-Dendrob. **1**, 324 (1910).

Dendrobium citrino-castaneum Burkill in Gard. Bull. Straits Settlm. **3**, 12 (1923).

Sarcopodium citrino-castaneum (Burkill) Ridl. Fl. Malay Penin. **4**, 29 (1924).

Katherinea citrino-castaneum (Burkill) A. D. Hawkes in Lloydia, **19**, 95 (1956).

K. zebrina (J. J. Sm.) A. D. Hawkes, l.c. 98 (1956).

Distrib. : Malay Peninsula, Sumatra, Borneo.

J. J. Smith and Holttum both consider that *Dendrobium citrinocastaneum* Burkill is conspecific with the earlier *D. zebrinum* J. J. Sm.

Excluded species

- (a) *Sarcopodium beccarianum* Kraenzl. in Engl. Pflanzenr. Orch.-Dendrob. **1**, 322, fig. 30 (1910).

Katherinea beccariana (Kraenzl.) A. D. Hawkes in Lloydia, **19**, 95 (1956).

Distrib. : Borneo.

This is clearly out of place in *Sarcopodium* and evidently a species of *Eria*. Schlechter identified it with ***Eria longerepens*** Ridl. and from the evidence available to me I consider that this is correct.

- (b) *Sarcopodium muricatum* (Finet) Rolfe in Orch. Rev. **18**, 240 (1910).
Dendrobium muricatum Finet in Bull. Soc. Bot. France, **50**, 377, t. XIV, fig. 1-6 (1903).

Distrib. : New Caledonia.

This species is now known as ***Inobulbon muricatum*** (Finet) Kraenzl.

- (c) ***Dendrobium parvulum*** Rolfe in Kew Bull. **1899**, 127.
Sarcopodium parvulum (Rolfe) Kraenzl. in Engl. Pflanzenr. Orch.-Dendrob. **1**, 322 (1910).
Katherinea parvula (Rolfe) A. D. Hawkes in Lloydia, **19**, 96 (1956).
Distrib. : Celebes.

This is not an *Epigeneium* but a true *Dendrobium* allied to *D. pumilum* Roxb.

- (d) *Sarcopodium perakense* (Hook. f.) Kraenzl. in Engl. Pflanzenr. Orch.-Dendrob. **1**, 328 (1910).
Dendrobium perakense Hook. f. Fl. Brit. Ind. **5**, 712 (1890).
Katherinea perakense (Hook. f.) A. D. Hawkes in Lloydia, **19**, 97 (1956).
Distrib. : Malay Peninsula.

This is not an *Epigeneium* but is conspecific with ***Eria javanica*** (Sw.) Bl.

- (e) ***Dendrobium prasinum*** Lindl. in Journ. Linn. Soc. Lond. Bot. **3**, 11 (1858).
Sarcopodium prasinum (Lindl.) Kraenzl. in Engl. Pflanzenr. Orch.-Dendrob. **1**, 322 (1910).
Katherinea prasina (Lindl.) A. D. Hawkes in Lloydia, **19**, 97 (1956).
Distrib. : Fiji.

On examination of the type specimen this is seen to be a true *Dendrobium* and not referable to the genus *Epigeneium*.

Cirrhopetalum lasiochilum (Par. & Rchb. f.) Hook. f. Fl. Brit. Ind. **5**, 772 (1890).

Bulbophyllum lasiochilum Par. & Rchb. f. in Trans. Linn. Soc. Lond. **30**, 153 (1874).

Cirrhopetalum breviscopum Rolfe in Curt. Bot. Mag. **131**, t. 8033, (1905).

Bulbophyllum breviscopum (Rolfe) Ridl. Mat. Fl. Malay Penin. **1**, 78 (1908) ; Ridl. Fl. Malay Penin. **4**, 74 (1925) ; Holttum in Fl. Malay. **1**, 404 (1953).

On examination of type material and original illustrations of the above two concepts as well as fresh material, I fail to find any significant differences between them. The differential characters given by Rolfe seem either quite inadequate or scarcely existent. *C. breviscopum* is supposed to have come from Perak in the Malay Peninsula but it is interesting to note that it has not been collected in the wild in Malaya by anyone. The species may occur there but the original cultivated specimen may well have come from the southern part of Burma where *C. lasiochilum* is native. The species was collected also on two occasions in recent years by Mr. H. B. G. Garrett on Doi Chiengdao in western Thailand.

Robiquetia spathulata (Bl.) J. J. Sm. in Nat. Tijdschr. Ned. Ind. **72**, 114 (1912).

Sarcanthus armeniacus Rchb. f. in Otto & Dietr. Allg. Gartenz. **24**, 219 (1956).

Examination of the type material of *Sarcanthus armeniacus* in the Reichenbach Herbarium shows clearly that it is conspecific with the well known Malaysian species *Robiquetia spathulata*. The inflorescences and flowers are identical with those of Malaysian material but the only leaf present is narrower than usual. As horticulturists are often disinclined to remove the larger and more healthy leaves from plants it is perhaps not surprising that only a small one was sent to Reichenbach.

The above identification also shows that the country of origin of the plant could not have been Sierra Leone, as stated in the original description. It appears therefore probable that the labels were changed during cultivation.

THE GENUS CROCUS IN ISRAEL AND NEIGHBOURING COUNTRIES.

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For over ten years I have been collecting and growing *Crocus* species of Palestine. In 1953 I had the opportunity of working at the Kew Herbarium and of using its excellent library. The Herbaria of the British Museum (Natural History) and of the Edinburgh Royal Botanic Gardens were also open to me. Mr. P. Mouterde kindly lent me some of his specimens. To all persons who kindly assisted me in these studies I express my sincere thanks.

Counts of somatic chromosomes of several *Crocus* species were also carried out. The result will be discussed elsewhere. In this paper data on chromosome numbers of *Crocus* species from literature and from my own counts are recorded.

This review, based on study of herbarium material and of living plants, brings a change to the list of Palestinian *Crocus* species. Their number is seven, as compared with 5 recorded by Post (1933) and 4 recorded by Eig (1932). Alterations in the conception of some of the species are proposed.

In the following enumeration of the examined species, their sequence is according to Maw (1881) and Boissier (1884). The abbreviations of Herbaria are according to the Index Herbariorum.

Enumeration

Div. I. Involucrati.

Sect I. Fibro-membranacei, Autumnales.

1. ***C. ochroleucus*** Boiss. et Gaill. in Boiss. Diagn. Ser. II, 4 (1859) : 93.

Icon. : Hook. fil. in Bot. Mag. t. 5297 ; Maw, Monogr. t. 11.

2 n = 10 (Mather 1932 ; Feinbrun, unpubl.)

Specimens examined : Lebanon : Près Saida 30.12.1852 Gaillardot (type ! K BM) ; ibid. 1852 Blanche 319 (K BM) ; Shibaniyeh to Bhamdun 2.11.1924 Eig (HUJ). Palestine : Upper Galilee, Jebel Jermak, 1100 m. *Quercetum calliprini infectorie-tosum* 2.11.1950 Feinbrun (HUJ) ; Manara 10.1944 T. Kushnir (HUJ) ; Amyûn Dec. 1865 Fox (K).

This East-Mediterranean species is endemic to the Lebanon and Northern Palestine. On Jebel Jermak in Upper Galilee it grows together with *C. hyemalis* and *C. elwesii*.

Besides possessing a basal spathe, *C. ochroleucus* differs from *C. hyemalis* by the white colour of anthers and pollen and by its style. The latter is divided into three branches which are dilated at apex, entire or branching only near the tip. The styles of *C. hyemalis* are divided into numerous capillary stigmatic branches. The latter character is useful for identification of herbarium specimens in which the colour of anthers is not easily discernible.

2. **C. Kotschyanus** *C. Koch* Index Horti Berol. 1853 (1854) : 17.

Syn. : *C. zonatus* J. Gay in Bal. Fl. Or. (1855) No. 823.

Icon. : Maw Monogr. t. 4 ; Bot. Mag. 9044 (1925).

2 n = 8 (Mather 1932).

The occurrence of this species on Mt. Hermon recorded by Post (1896 ; 1933) and Bowles (1952) needs verification. Mouterde (1954) did not find it among other Crocuses on Mt. Hermon.

Sect. II. Reticulati, Autumnales.

The *C. sativus* group.

Maw (1886) and Bowles (1952) treated this group as one species, with the cultivated form as the type and the wild ones as varieties. However, most authors dealing with the floras of the countries concerned justly accept these varieties as distinct species.

In my opinion the following should be treated as species : (1) *C. sativus* L. (the cultivated form). (2) *C. orsinii* Parlat. (Ascoli, Italy). (3) *C. hadriaticus* Herbert (Albania, Greece). (4) *C. cartwrightianus* Herbert (Greece). (5) *C. pallasii* Goldbach (Italy, Balkan Penins., Crimea). (6) *C. elwesii* (Maw) O. Schwarz (Asia Minor, Cretà, Lebanon, Syria, Palestine). (7) *C. dispathaceus* Bowles (Syria). (8) *C. moabiticus* Bornm. et Disnm. (Moab). (9) *C. haussknechtii* Boiss. (Persia).

The *sativus* group can be characterized by several traits shared by all of its species : (a) one or two basal spathes, i.e. membranous phyllomes borne at the base of the scape, above the insertions of the sheathing and green leaves ; (b) finely reticulated tunics of corm ; (c) undivided stigmatic branches which gradually thicken towards the apex ; (d) numerous leaves (6 or more), usually but not always scabrous at margins.

Though characteristic for the whole *sativus* group in their general build, the stigmatic branches display a gamut of variations. Maw (1881, 1886), Bowles (1924, 1952) and other authors record their length, referred to the perianth and the stamens. Bowles used this character for subdivisions of the group into sub-group.

To my knowledge, the length of stigmatic branches is subjected to considerable intraspecific variation and taken alone cannot be used for delimitation of species. It becomes significant when combined with another character, namely the level at which the style divides into stigmatic branches. This level is constant for every species of the group and ranges within the group, from down the throat of the perigonium to the level of the middle of the anthers. Maw neglected this character and was not consistent in its description for *C. sativus*. However, in the plates of his Monograph there are figures depicting the style and anthers of several varieties and showing clearly the differences between them as to the level at which the style is dividing. In the key for identification of species of the *sativus* group (see below) this character is used with profit. The key does not include *C. sativus*, *C. orsinii* and *C. hadriaticus*. Maw's plates 29 and 30 show that the styles of *C. sativus* and *C. hadriaticus* divide at the level of the middle of the anthers, while the style of *C. orsinii* divides below the bases of the anthers.

Key for identification of species of the sativus group.

1. Style very short, dividing below the bases of the anthers ; tips of stigmatic branches reaching about the middle of the anthers. Leaves appearing after flowering ; tunics and delapidated leaves of previous years produced into a thick mat along the spathe. A second basal spathe, lorate in shape, is present. Flowers deep vinous-purple, segments of perigonium usually narrow, acute. Syria and the Lebanon.

C. dispathaceus Bowles (1924)

—Plants with a different set of characters and usually a longer style 2

2. Plants of alpine altitudes in W. Persia. Tunics of corm produced about 7–9 cm. along the spathe. Flowers pale blue, bearded at throat. Leaves scabrous, appearing after or during flowering. Stigmata somewhat shorter than anthers . . . *C. haussknechtii* Boiss. et Reut. (1865)

—Tunics not produced as above 3

3. Flowers small, vinous purple ; perigonium segments, 1.5–2 cm. long, 3–7 mm. broad. Style dividing below the bases of the anthers ; stigmatic branches longer than anthers and usually about as long as perigonium (rarely shorter). Leaves appearing after flowers, 11–13 in number, scarcely 1 mm. broad, margins smooth. Plants of Moab and Syria . . . *C. moabiticus* Bornm. et Dinsm. (1912)

—Plants with a different set of characters. 4

4. Style dividing in the throat of perigonium, much below the bases of the anthers (Fig. 2A) ; stigmatic branches overtopping the anthers and about as long as perigonium segments. Throat of perigonium bearded, not yellow. Leaves synanthous. Plants of lower hills of Greece.

C. cartwrightianus Herb. (1843)

—Style dividing above the throat of perigonium. Stigmatic branches shorter than above. 5

5. Style dividing at the level of the bases of anthers or below (Fig. 2B). Throat of perigonium yellow, bearded. Leaves ciliate at margins and keel, 3–4 mm. broad. Area of the plant extending from Italy to Dalmatia, and across the Balcan Peninsula to Crimea.

C. pallasii Goldbach (1817)

—Style dividing much above the bases of the anthers (Fig. 2C). Throat of perigonium not yellow and not bearded. Leaves usually glabrous. Area of the plant extending from Asia Minor to the Judean Mountains.

C. elwesii (Maw) O. Schwarz (1934)

C. pallasii and *C. cartwrightianus* do not belong to our region and are not dealt with in this paper. In the key *C. pallasii* includes also the Italian *C. thomasi* Ten. which to all appearances cannot be regarded as a distinct species. Contrary to Bowles the Italian Floras (Fiori and others) describe *C. thomasi* as being “a fauce giallogniola”.

3. **C. elwesii** (Maw) O. Schwarz, Add. ad Florulam Lydiae I, in Fedde Repert. 36 (1934) : 74.



FIG. 1. *Crocus elwesii*
(Maw) O. Schwarz.

Syn. *C. sativus* L. var. *elwesii* Maw (1886) : 171 ; **C. olbanus** Siehe (1906) in Allg. Bot. Zeitschr. 12 : 1 ; *C. oreoreticus* Burtt, in Phytion 1 (1949) : 224. *C. thiebauti* Mousterde et *C. libanoticus* Mousterde, in Bull. de la Soc. Bot. de France 101 (1954) : 422.

Icon. : Maw Monogr. t. 29 c ; this paper, fig. 1.

$2n = 15$ (Mather 1932), $2n = 14$ (Feinbr. unpubl.).

Specimens examined: Asia Minor, Bogh Dagb, 20.10.1874 H. J. Elwes (BM). Mytilene Island, Monastiraki, rocky ground, 500–900 m. 23.11.1952 Goubimy; S. Lebanon: Jabal Barouk, au dessus de Kefraya, ca 1000 m. 28.10.1954 Mouterdet (sub *C. libanoticus*). Syria: Plaines du Hauran sous l'Hermon, Nov. 1947 Dubertret (sub *C. thiebauti*); Antilebanon 8000 ft., Oct. 1934 W. A. West (K). Palestine, Upper Galilee: Rosh Pina to Safad, 26.9.1926 Eig; Manara, 800 m. *Poterietum spinosi* with remnants of Maquis, 20.11.1943 D. Zohary; Jebel Jermak, 1100 m. open spaces in the Maquis area 27.11.1947, and 1950 Feinbrun. Judean Mts.: East of Khalkhul, Batha, ca 1100 m., 18.11.1944 T. Kushnir, D. Zohary, D. Raz. (All in HUJ).

The plant collected by Elwes in Asia Minor has been described by Maw (1886) as a variety of *C. sativus*. O. Schwarz, who collected it at Pergamon "in silvis Pini Pineae abundans solo granitico fl. Dec. No. 362", raised it to the rank of a species.



FIG. 2. Stamens and stigmatic branches. A. *Crocus cartwrightianus* Herb. B. *Crocus pallasii* Goldb. C. *Crocus elwesii* (Maw) O. Schwarz.

Until recently this species was known only from Asia Minor and remained one of the last known species of the *sativus* group. Maw described it in his Synopsis (1881) as "a plant with a large corm and flower, but with the short stigmata of *C. pallasii*" and in his Monograph (1886): "is closely allied to the well known and widely distributed form, var. *pallasii*, but is a plant of larger stature the pistil is short, scarcely exceeding the stamens, as in var. *pallasii*". Thus from Maw's description there is no difference other than size of the plant to distinguish between *C. elwesii* and *C. pallasii*. However, Maw's plate XXIX^c fig. 4 clearly shows that the style of *C. elwesii* divides at the level of the middle of the anthers, whereas plate XXIX^d fig. 5, shows that in *C. pallasii* the style divides below the bases of the anthers (compare our figs. 2 B, C).¹ As I pointed out above, this is a very significant difference in the *sativus* group, though the absolute length of the stigmatic branches may vary intraspecifically to a great extent. The style of *C. elwesii* divides higher than in any other species of this group and in this regard forms the extreme end of the range of variability.

¹It is noteworthy that for *C. pallasii* Maw figured style and anthers of three specimens, two of them from S. Italy (pl. 29d fig. 5 f, h) and one from Dalmatia (fig. 5 g). In all three of them the style divides below the bases of the anthers.

The stature of the plants of *C. elwesii* varies considerably in the material from Palestine, Lebanon and Syria. Some of the specimens approach the size of those from Asia Minor (ca 20 cm.), others resemble middle-sized *C. pallasii*. The size of *C. pallasii* ranges according to Wulf (1929) from 7.5 cm. to 16 cm. In the population on Mt. Meron (Jebel Jermak) in Upper Galilee specimens displayed considerable variability in stature.

Another character varying within *C. elwesii* is the scabrosity of leaves. In some specimens the leaves are scabrous at margins, in others they are smooth, or only the tips of the leaves are somewhat scabrous. Mouterde described the leaves of *C. thiebauti* as smooth, and those of *C. libanoticus* as denticulate.

Owing to the fact that *C. elwesii* was never clearly differentiated from other species, several species were described from the Eastern Mediterranean, which are synonymous with *C. elwesii*.

C. olbanus Siehe from Cilicia. The type specimen of Siehe that I examined in the British Museum does not seem to differ from *C. elwesii* except in paler flowers and narrower perigonium segments.

C. oreoreticus Burt from Crete. Burt differentiated his Cretan plants from *C. thomasi* and *C. pallasii*, but did not mention *C. elwesii*. Some of the specimens on which *C. oreoreticus* was based were examined by me. They are rather small-sized specimens of *C. elwesii*.

C. thiebauti Mouterde from Syria and *C. libanoticus* Mouterde from the Lebanon. Mouterde (1954) differentiated *C. thiebauti* only from *C. moabiticus*. As to *C. libanoticus* he says: "Se rapprochant par le port général du précédent (*C. thiebauti*), ce *Crocus* s'en éloigne par toute une série de caractères, ses tépales veinés, ses feuilles denticulées, l'absence de spathe basale". Later, Mouterde (in a letter) recognized that his "bracteola minuta" of *C. libanoticus* was actually a short basal spathe.

The number of chromosomes of *C. elwesii* is given as $2n = 15$ by Mather (1932). I found $2n = 14$ in specimens from Upper Galilee and also in a specimen from Syria (Hauran) sent to me by Mouterde in 1947 and identified in his paper (1954) as *C. thiebauti*.

In the description of *C. libanoticus* one reads: "Stylus una cum stigmatibus dimidiam antheram vix superat". Indeed in one specimen of *C. libanoticus* and in one of *C. thiebauti* I found that the styles were shorter than is usual in *C. elwesii*. However, the division of the style is much above the bases of the anthers, as in the rest of *C. elwesii* from other parts of its area.

The geographical area of *C. elwesii* is East-Mediterranean. It comprises Asia Minor, Crete, Lebanon, Syria and Palestine. Its southernmost station is in the Judean Mountains, between Jerusalem and Hebron.

Since no complete description of *C. elwesii* has ever been published, a description based on specimens from various parts of its area is given here. Corm flattish, 1.5–2.5 cm. in diameter. Tunics numerous, finely reticulate, somewhat produced along the scape. Sheathing leaves 2–3. Basal spathe present, sometimes short. Proper spathe diphyllous. Leaves numerous, 6–12, appearing towards the end of anthesis, scabrous or smooth at margins, about 1 mm. broad. Flowers 2–5. Tube much longer than limb. Tepals 3–6 cm. long, 5–10 mm. broad, usually lilac

with darker veins. Filaments short, anthers yellow, linear, 1.5–2.5 cm. long. Style dividing above the bases of the anthers, at about $\frac{1}{3}$ or $\frac{1}{2}$ the anthers' length; stigmatic branches orange, gradually thickening towards apex, reaching the tips of anthers or shorter. Flowers in October and November.

4. **C. haussknechtii** Boiss. et Reut. in Hausskn. Pl. exs. 1865; Boiss. Fl. Or. 5 (1884) : 100.

Syn. : *C. sativus* L. var. *haussknechtii* Maw Monogr. (1886) 176.

Specimens examined : Persia : in gramin. Kharput 4000 ft. 18.10.1865 Haussknecht (type ! K BM) ; in apricis m. Dalachani, Kurdistan, Oct. 1867, Haussknecht (K BM) ; in apricis m. Dalachani, Kurdistan, Oct. 1867, Haussknecht (K BM) ; Kharput 3.2.1889 Sitenis 273 (leaves ; K) ; Shiraz, Chick 106, 192^c (K).

As pointed out by Maw, the most remarkable character of this species is "the great height to which the cap of the tunic is produced as a bunch of silky fibres above the summit of the corm". The length of these fibres is about 7–9 cm. In this *C. haussknechtii* is similar to *C. dispathaceus*, from which it differs by the lack of a second basal spathe, by its flower colour, and by somewhat longer stigmatic branches which reach about half of the length of the perigonium segments. Its perigonium is bearded at throat. The leaves appear after flowering.

No drawing of *C. haussknechtii* has ever been published. This species is confined to Persia and is the easternmost species of the satius group. The record from Palestine (Eig., Feinbrun, Zohary 1948) is to be referred to *C. elwesii*.

5. **C. dispathaceus** Bowles, Handb. of Crocus and Colchicum (1924) : 67–68.

Specimens examined : Syria : Aleppo ? Comm. G. Egger 17.12.1912 H 3227 (type ! K) ; Aleppo, Amer. College Grounds, 350 m. in shallow soil over limestone 3.11.1950 "Flowers deep mauve", E. Chapman 102 (K) ; Cedars, Syria, Sept.–Oct. 1860 Dr. J. D. Hooker and D. Hanbury (note by Maw : "is this an early flowering specimen of *C. Gaillardoti* ?") (K) ; Syria ? (HUJ)

This species has been published by Bowles without latin description, but its name is valid according to the rules of nomenclature, being published before 1935.

The distinctive characters of *C. dispathaceus* according to Bowles are : (1) a double basal spathe, (2) perigonium segments narrow and of a deep vinous purple, (3) stigmatic branches unusually short, ending in the throat, much below the bases of the anthers, (4) anthers long, yellow ; filaments reddish. A few other important characters can be added : (5) corm rather large, (6) the fine, reticulate tunics and many-layered dilapidated sheathing leaves of previous years forming a thick mat, 7–10 cm. long, above the corm and around the sheath of flowers, (7) proper spathe reddish, (8) leaves 10–12, very narrow, appearing during or shortly after flowering. The flowering season is September to November. The species seems to be endemic to Syria and Lebanon.

C. macrobolbos Jovet et Gombault (1955–6, Bull. Soc. Bot. France 102 : 332–9, 103 : 460) does not seem, from photograph and description, to differ from *C. dispathaceus* Bowles.

6. ***C. moabiticus*** Bornm. et Dinsmore in Fedde Repert. 10 (1912) : 383 ; Post-Dinsmore, Fl. of Syria, etc., 2 (1933) : 584.

Specimens examined : Transjordan : Moab, Ziza Dinsmore (specimens grown in Jerusalem by Dinsmore from corms coll. at Ziza HJ) ; Moab, near Karak, 5.11.1925 W. K. Bigger, under *C. sativus* var. *cartwrightianus*. "Flower appears before leaves. Semi-desert country. Perigonium white, veined purple, styles scarlet" (BM).

This rare species is the smallest plant in the whole *sativus* group. Its distinctive characters are : (1) flower dark vinous purple, (2) perigonium segments small (1.5–2.5 cm. long, 3–7 mm. broad), (3) leaves numerous, very slender (1 mm. broad at most) ; (4) stigmatic branches as long or longer than perigonium segments, style divided in the throat of perigonium ; (5) filaments often purple.

Mouterde (1954) records a specimen of *C. moabiticus* from the eastern slope of Mt. Hermon, with stigmatic branches shorter than perigonium.

C. moabiticus is an Irano-Turanian species endemic to Transjordan and S. Syria.

Div. II. Nudiflori.

Sect. I. Reticulati, Autumnales.

The *C. cancellatus* group.

In this group Maw (1881) and Boissier (1884) included one species only, *C. cancellatus* Herb. Maw (1881, 1886) distinguished within *C. cancellatus* the type form from Greece and one variety, var. *cilicicus*, from Asia Minor and Syria, in which he included *C. damascenus* Herb. Boissier (1884) quoted three forms : the type from Greece, var. *damascenus* from Syria and var. *cilicicus* from Cilicia.

In my opinion, the *cancellatus* group consists of three species : *C. cancellatus* Herb. from Cilicia and Lebanon, *C. mazziaricus* Herb. from Greece and *C. damascenus* Herb. from Syria. This treatment of the group implies changes not only in the rank of the taxa but also in the interpretation of the true *C. cancellatus* Herb.

(1) In spite of possessing a number of characters uniting the above three taxa into a natural group, they display variability in several weighty characters which parallels to a large extent the variability within the *sativus* group. The three species of the *C. cancellatus* group differ among themselves in the size of plant and corm, in the shape and colour of perigonium segments, in the level reached by the stigmatic branches as compared with the height of anthers and with the length of perigonium segments. The three species also differ in their geographical area, in altitude of their habitats and in their flowering time. These differences justify the distinction of the three forms as separate species.

(2) The identification of the typical *C. cancellatus* with plants from Greece goes back to Maw. This however is in variance with the original ideas of Herbert on *C. cancellatus*. Herbert dealt with *C. cancellatus* in several publications (1841, 1843, 1845, 1846, 1847). In 1845 he published *C. damascenus* from near Damascus as a species ; *C. damascenus* was also treated as a species in his posthumous "History of the species of *Crocus*" (1847). The plants of Damascus were never included into *C. cancellatus* by Herbert himself.—*C. cancellatus* was described by Herbert for the first time in 1841. After a short description comprising the passage :

"stigmatibus . . . antheras sub-aequantibus", and without any data on the source of the plants, the species is subdivided into two varieties as follows :

"var. 1. *kotschyanus*, minor limbo circ. $1\frac{1}{4}$ unc. In Syriâ legit aestate Th. Kotschy. Herb. Bentham ; in Tauriâ Herb. Hooker".

"var. 2. *naupliensis* : major limbo circ. $1\frac{3}{4}$ unc. Spec. Octobri pr. Naupliam lecte perperam *C. nudiflorus* Herb. Bentham. Vivos non vidi".

In 1843 the same descriptions of the two varieties are given in the same sequence.

In 1845 Herbert published *C. mazziaricus* from Greece (Bot. Reg. Misc. p. 3), but during the same year (Bot. Reg. p. 81) he described from Greece *C. cancellatus* var. *margaritaceus*, to which he quotes var. *naupliensis* as synonym, and var. *mazziaricus*, as a variety of *C. cancellatus*. In the posthumous History, etc. (1847, p. 276) one reads : *C. cancellatus* Herb. "Three varieties must be distinguished : 1. *kotschyanus* etc., 2. *margaritaceus*, etc. 3. *mazziaricus*, etc.". From the above quotations it is quite clear that Herbert never regarded the Greek plants as the type. On the contrary, var. *kotschyanus* is cited as first in every paper in which varieties of *C. cancellatus* are enumerated.

Kotschy, who collected the original specimens of *C. cancellatus* on Mt. Taurus (Cilicia) cited them (1859, p. 380), among the plants collected on Bulgar Dag, under *C. cancellatus* W. Herb.

The published evidence thus nowhere shows that the Greek, rather than the Cilician (Taurus) form (var. *kotschyanus*) has to be regarded as Herbert's typical *C. cancellatus*. Since I consider each of these forms as a separate species, the assignment of the name *C. cancellatus* Herb. to the cilician form appears more justified.

During a visit to the Lindley Library of the Royal Horticultural Society in London I found a further confirmation to my interpretation of Herbert's *C. cancellatus*. In that Library drawings from Herbert's hand are preserved.¹ Apart from a drawing of *C. damascenus* which was published in the Botanical Register (1845), there are two drawings which were made from dried specimens and were never published : (a) drawing of a plant with pale blue flowers bearing the note : "*C. cancellatus* mihi Aestate 1836. In Syria legit Th. Kotschy No. 509 Herb. Bentham", (b) drawing of a larger plant bearing the note : "*C. cancellatus* var. *major* Oct. Nauplia misnamed *nudiflorus* Herb. Bentham 129". These notes clearly show that Herbert considered the Greek plant as a larger form of his "*C. cancellatus* mihi". There is thus every reason to regard Kotschy's plant as the type specimens of *C. cancellatus*.

The following key to the three species of the *cancellatus* group will emphasize their distinctive characters :

1. Styles much shorter than stamens, branching in the throat of perigonium. Anthers usually curved, ending at about $\frac{1}{2}$ of the length of the greyish perigonium segments. Net of tunics very coarse. Leaves 3-4. Steppe plants of higher altitudes in Syria, Cis- and Transjordan, Iraq and Persia. $2n = 8$ *C. damascenus* Herb. (1845)

¹My sincere thanks go to Mr. W. T. Stearn who kindly showed these drawings to me.

—Styles longer, branching above the throat of perigonium. Plants of Greece, Asia Minor and Lebanon. 2

2. Stigmatic branches ending much above the stamens and at about $\frac{3}{4}$ of the length of perigonium segments. Perigonium white or pale lilac, colour fading when dry; segments 3.5–4.5 cm. long, 12–15 mm. broad. Flowering October to November. Leaves 7. Mediterranean hills of Greece. $2n = 16$ *C. mazziaricus* Herb. (1845)

—Stigmatic branches ending at about $\frac{3}{4}$ of the length of anthers. Perigonium purple, mauve when dried, segments 2.5–3 cm. long, 6 mm. broad. Corm and whole plant smaller. Flowering September to October. Alpine altitudes in Asia Minor and Lebanon. $2n = 8$.

C. cancellatus Herb. (1841)

The following characters are common to the whole *cancellatus* group : (a) tunics reticulate with coarse fibres forming oblong or rhombic interspaces, the rigid fibres slightly produced above the corm; (b) plants hysteroanthous, flowers autumnal.

7. ***C. cancellatus* Herbert**, *Crocorum Synopsis* in *Bot. Mag.* 67 (1841) post tabulam 3864 p. 2.

Syn. : *C. cancellatus* var. *cilicicus* Boiss. *Fl. Or.* 5 (1884) 102. *C. cilicicus* Ky. ex Maw in *Gard. Chron.* nr. 11 (1879) : 235. *C. pylarum* J. Gay in *Tschich. As. Min.* 2 (1866) : 525.

Icon. : Maw, *Monogr.* (1886) t. 31 b.

$2n = 8$ (Feinbr. unpubl.).

Specimens examined : Asia Minor : In Monte Tauro Aestate 1836 Ky 509 Herbarium Hookerianum (type ! K) ; Cilicia, in Tauri alpes Bulgar Daghy Ky 316 copiosissime in declivitate austro obversa Daghy Olug, Tschidem Goli, et Bulgar Magara aquiloni opposita. Alt 8000 ft. 31.8. et 22.9.1853 (K) ; Partie superieure des montagnes dominant le défilé des Portes Ciliciques, 12.10.1855 Balansa (BM) ; Reg. alpine de Taurus, au dessus de Bulgarmaden 17.9.1855 Balansa 821 (BM) ; Berge nördl. v. Halep bei Sivas, Oct., Siehe (sub *C. cancellatus* Herb., BM). Lebanon : Jebel Kenisse 6.9.1947 Mousterde (HUJ) ; Lebanon, 28.9.1860 Hooker et Hanbury (K).

This is the true *C. cancellatus* of Herbert, as shown in the preceding discussion. The geographical area of the plant comprises Southern Asia Minor and the Lebanon, where the plant is confined to alpine altitudes. Herbert (1847 p. 276) describes it as growing in Mt. Taurus on "dark reddish brown ferruginous earth", where "it is abundant, and it purples the ground". Compared with the other two species of the *cancellatus* group, it is the smallest in size, the more delicate and handsome. Maw (1886) gives a good drawing of this plant on plate 31 b, under var. *cilicicus*. The number of leaves of this species is not known.

8. ***C. mazziaricus* Herb.** *Bot. Reg.* (1845) Misc. p. 3.

Syn. *C. cancellatus* auct. fl. gr. ; *C. cancellatus* Herb. var. *mazziaricus* Herb. (1847) et var. *magaritaceus* Herb. *Bot. Reg.* (1845) Misc. 81. *C. cancellatus* Herb. var. *naupliensis* Herb. *Bot. Mag.* 67 (1841) post tab. 3864 p. 2. *C. cancellatus* Herb. var. *major* Herb. in litt. ; *C. cancellatus* Maw p.p. (1886) 184 ; *C. spruneri* Boiss. et Heldr. *Diagn.* 17 (1846) 103 ; *C. schimperi* J. Gay in Heldr. *Fl. cephal.* 69.

Icon. : *Bot. Mag.* (1874) 6103 ; Maw, *Monogr.* (1886) t. 31 a.

2 n = 16 (Mather 1932, under *C. cancellatus*).

Some of the specimens examined : Greece : Nauplia (Argolis) Oct. 1836 (type spec. of var. *naupliensis* Herb. K) ; Mt. Hymetto, Orphanides 69, 27.9. (K) ; ibid. 14.10.1864 Heldreich 441 (type specimen of *C. Schimper* Gay K) ; Attica, in collibus maritimis Piraei 5.11.1888 Heldreich (HUJ) ; Chelmos above Kalavryta 4000 ft., 15.10.1939, P. H. Davis 979, note : "Petals white within, shading to faint buff—yellow at base ; outside white w. feathering of grey-violet near base, often suffusing the stem" (K).

C. mazziaricus Herb. seems to be the only valid specific name for the Greek plants of the *cancellatus* group. As mentioned above, Herbert described two varieties from Greece, var. *margaritaceus* (= var. *naupliensis*) and var. *mazziaricus*. From his descriptions the differences between them concern the colour of the flower, which apparently varies in this species from white to pale violet. On the other hand, both from Herbert's descriptions and from specimens examined by me, there is no significant difference among the Greek plants in the relative length of styles and anthers or in the size of flower.

Ecologically, *C. mazziaricus* differs from *C. cancellatus* by growing at lower altitudes in the Mediterranean parts of the Balcan peninsula. The highest altitude recorded for this species is 4000 ft. (1200 m.).

9. **C. damascenus** Herb. Misc. Matter in Bot. Reg. (1845) : 1.

Syn. *C. cancellatus* Herb. var. *damascenus* Boiss. Fl. Or. 5 (1884) : 101 ; *C. edulis* Boiss. et Bl. Fl. Or. 5 (1884) : 101.

Icon. : Herbert Bot. Reg. (1845) tab. 37, fig. 1.

2 n = 8 (Feinbr. unpubl.).

Specimens examined : Syria : Antiliban, Damas $\frac{1}{2}$ heure au delà de Dimas, route de Damas, 5.1.1859 Gaillardot (K). Cisjordan : Negev : Plateau of Rammon, Naqb es Sahel 900–1000 m. Artemisietum herbae-albae (grown from corms coll. by D. Zohary 1945, fl. 24.10.1947 (HUJ) ; Sahel el Hawa, loess 800 m. 16.10.1949 Bojko (HUJ), Wadi Ajram, near Ras Rammon, loess, 950 m. Tadmor 17.10.1949 (HUJ). Transjordan, Edom : 29 km. E. of Wadi Musa, 1300 m. Artem. herbae-albae, 29.3.1936 Eig, Feinbrun, Zohary (leaves ; HUJ) ; 33 kms. S.W. of Ma'an, 1400 m. Artem. herbae-albae 30.3.1936 EFZ (leaves ; HUJ) ; 8 km. E. of Wadi Musa 1400 m. Artem. herbae-albae 29.3.1936 EFZ (leaves ; HUJ). Iraq : Quajarh, Mosul, 640 feet, 5.12.1938, Baytres (K). Persia : Konid 11.1919 ; 6 miles fr. Khorramabad in the Malayir road, above 3000 ft., 10.12.1935 A. C. Trott 386 (K).

C. damascenus has been described from "montibus aridis calcareis prope Damascus". Its rather wide geographical range is confined to the Irano-Turanian region. According to Maw, Bowles and Mouterde this is one of the abundant Crocuses the corms of which are collected for food and sold under the name of Hursinein.

C. damascenus is prominent by its large corm clothed by many layers of coarse reticulate tunics, which under the arid conditions are preserved for several years. Dry leaves of preceding years thickly cloth the lower part of the sheathing leaves. The styles are short ending below the tips of the long curving anthers. The flower is rather small with narrow greyish mauve perigonium segments.

Sect. II. Membranacei, Vernales.

10. **C. aleppicus** Baker in Gard. Chron. (1873) : 609.

Syn. *C. gaillardoti* (Boiss. et Bl.) Maw in Gard. Chron. 16 (1879) : 558. *C. hyemalis* Boiss. et Bl. var. *gaillardoti* Boiss. et Bl. Diagn. Ser. 114 (1859) : 93.

Icon. : Maw, Monogr. t. 48.

Specimens examined : Syria : In gram. Aleppo 1867 Haussknecht (type ! K) ; Entre Damas et Dimas sur le plateau qui separe Dimas de Barrada, 10.1.1853 Gaillardot (type of *C. Gaillardoti*, K) ; Antiliban, entre Djeledjennine et le Merj Jautha 6.1.1853 Gaillardot (type K) ; village Scanderouna 12.12.1852 Blanche (K BM) ; in m. Antilibano pr. Damascus Gaillardot sub *C. hyemalis* var. (K) ; Djebel Nahar pr. Aleppo, in gram. 18.1.1867 Hausskn. (BM) ; ibid. Hausskn. 911 (HB). Transjordan, Edom, Wadi Musa to Shaubek 5000 ft. P. H. Davis 2225 (HJ).

The tunics of the corm are made into a fine net of more or less parallel anastomosing fibers. The anthers are white and the filaments yellow. Stigmatic branches are very slender and usually longer than stamens (in Maw's drawing as long or shorter). It is an Irano-Turanian species.

11. ***C. hermoneus*** *Ky. ex Maw* in Gardn. Chron. n.s. 16 (1881) : 559.

Syn. *C. palaestinus* Feinbr. in Eig, Zohary and Feinbrun (1948).—*C. hyemalis* var. *violaceo-splendens* Born. et Dinsm. in herb.

Icon. : Maw, Monogr. t. 44 (fruiting specimen) ; this paper, fig. 3.

2 n = 12 (Feinbr. unpubl.).

Ninety nine years after its discovery the mystery of this species has been definitely solved.

In June 1855 Kotschy collected near the top of Mt. Hermon (Syria) a fruiting *Crocus* which he named *C. hermoneus* (in schedis). His specimens were preserved at the Herbarium of the Museum of Vienna where they apparently perished by fire towards the end of World War II. The fruiting specimens were described and figured by Maw (1881, 1886). Maw designated *C. hermoneus* as a spring-flowering species. Owing to the lack of flowering specimens, Boissier placed *C. hermoneus* at the end of the genus as "Species non satis nota".

In June 1897 Bornmüller, accompanied by the well known collector G. Egger of Jaffa, followed the route of Kotschy and he too collected fruiting specimens of *C. hermoneus*, which he identified by their corms. Some of the collected corms were grown by Egger in Jaffa and by Leichtlin in Baden-Baden. From them Bornmüller received a few flowers which enabled him to conclude, contrary to Maw, that *C. hermoneus* was an autumn-flowering species. In his paper (1899) Bornmüller gave a description of the flowers of *C. hermoneus*, and corrected the description given by Post (1896). Post apparently was in possession of a flowering *C. hermoneus*, but published no record of the specimen in *Plantae Postianae*, nor was a specimen preserved in Post's or any other Herbarium. In 1953 I found no specimens of *C. hermoneus* from Mt. Hermon either in the British Museum or at Kew.

Bornmüller's paper (1899) apparently remained unnoticed and was never mentioned by Dinsmore in the second edition of Post's *Flora* (1932-33), though one specimen of Bornmüller (nr. 1512) is recorded there for *C. hermoneus*. There is similarly no reference to this paper by Bowles (1924, 1952) who concluded : "I think we have not yet received Kotschy's plant". Thus the mystery of *C. hermoneus* persisted.

It is therefore with relief that I read the fine contribution by Mouterde (1954) who finally succeeded in clarifying the identity of *C. hermoneus*. Mouterde, for the first time, collected flowering specimens of *C. hermoneus* on two trips to the top of Mt. Hermon (31.10.1946 and 15.9.1948), at the

classical locality and somewhat below it. He was able to identify the species (a) by its site as described by Kotschy (1864), (b) by its corms corresponding to the figure by Maw, (c) by the corresponding time of flowering and of the characters of the flowers to those given by Bornmüller. Mouterde's evidence leaves no reasonable doubt that his plants belong to the true *C. hermoneus* of Kotschy.



FIG. 3.
Crocus hermoneus Ky.

Additional material enables me to contribute to the knowledge of *C. hermoneus* in two points : (a) area of distribution, (b) affinities.

In November 1945, and also at later dates, I observed north of Ramallah (Samaria, Palestine) a population of a *Crocus*, growing together with the wide-spread *C. hyemalis*, but quite distinct from it. Being unaware of the paper by Bornmüller, I described this *Crocus* as a sp. nov.* Later I found in our Herbarium several specimens of the same species

**C. palaestinus* Feinbr.

collected by Eig in Transjordan. At Kew I found one specimen of my *C. sp. nov.* collected in Jerusalem (F. Meyers 4313) and identified as *C. hyemalis* var. *violaceo-splendens* Bornm. et Dinsm. ; and another specimen labelled : " Hortus Kewensis, coll. Egger, figured for the Herb. Kew. 13.10.1903.

Mouterde's paper (1954) convinced me that my *C. palaestinus* was the true *C. hermoneus* Ky. By the kindness of Mr. Mouterde I was able to examine one of his specimens from Mt. Hermon, which dispelled what little doubt there could be that *C. sp. nov.* was synonymous with *C. hermoneus*.

The number of chromosomes was counted by me in root tips of the specimens from Ramallah and found $2n = 12$. At present more reality can be assigned to *C. hermoneus*. According to the available data, its area of distribution extends from the top of Mt. Hermon southwards, through several points in Hauran (specimens by Dubertret recorded by Mouterde) to the hills of Ammon and Moav in Transjordan and to Samaria in Cisjordan where it reaches its southern limit at the outskirts of Jerusalem. The altitudinal range of the species is 700–2200 m. It is worth noting that the flowering time of *C. hermoneus* is earlier on the summit of Mt. Hermon (September to October) than on the hills of Palestine (November to December). Mouterde (1954) noted the same phenomenon for *C. damascenus*. Higher humidity and lower temperatures at the higher altitudes can be made responsible for this difference in flowering time.

As to the affinities of *C. hermoneus*, there is no doubt that within the group of Nudiflori, *C. aleppicus* is the nearest species. The character common to both of these species is the structure of their corm tunics. They are " crassiusculis parallele subreticulatim et dense fibrosis " (Boissier 1884) both in *C. aleppicus* and *C. hermoneus*, and differ in *C. hermoneus* chiefly in being produced in cusps along the scape. *C. hyemalis* differs from both by his tunics described by Boissier as " subcoriaceis laevibus, non fibrosis, inferne in laciniis lineares demum fissis ". The tunics of *C. hermoneus* are subreticulate, with parallel fibers interconnected by very short slanting anastomoses. In this they clearly differ from the tunics of all species of the *C. cancellatus* group, which are built of " coarsely-honeycombed fibers " (Baker 1892), or in other words, of fibers forming a loose net with distinct horizontal anastomoses. Boissier (1884) described them as " areolis oblongo-rectangulis ". In the taxonomic evaluation of the structure of tunics I disagree with Mouterde (1954) who doubts whether *C. hermoneus* is specifically distinct from the *C. cancellatus* group. Though I have made no study of the anatomy of tunics of the species concerned, I have no doubts that anatomical evidence will reveal considerable differences between the group of *C. cancellatus*, on the one hand, and *C. hermoneus* and *C. aleppicus* on the other. It is true that the degree of coarseness of the net varies within the cancellatus group (it is coarsest in *C. damascenus*). But the pattern of structure is uniform in the group as a whole and quite different from that of *C. aleppicus* and *C. hermoneus*.

Chromosome numbers counted by me support the distinctness of *C. hermoneus* ($2n = 12$) from the whole cancellatus group in which the following numbers were counted : *C. damascenus* $2n = 8$ (Feinbr. un-

publ.) ; *C. cancellatus* from the Lebanon $2n = 8$ (Feinbr. unpubl.) ; *C. mazziaricus* $2n = 16$ (Mather 1932 under *C. cancellatus* from Greece).

Since descriptions of *C. hermoneus* published so far are fragmentary, a full description is given below.

A few words on the variability within *C. hermoneus*. The length of the style as compared to the stamens varies considerably. I agree with Bornmüller (1899) that this variability is intraspecific. The colour of the stigmatic branches varies from orange to yellow. The colour of the flower is lilac, but varies in intensity. In the population near Ramallah I observed a few specimens with almost white flowers. It is possible that Post was in possession of a similar specimen. The throat of the flower in my specimens, as in those of Mousterde, is glabrous. Bornmüller, however, described his flowers as strongly bearded.

Cormus ovatus, tunicis parallele subreticulatim et dense fibrosis tandem solutis secus scapo in lacinias productis. Folia 4-5, fere synanthia, laeviter ciliatula, 2 mm. lata, albo-vittata. Spatha propria bivalvis, perigonii tubo brevior. Flores hyemales, perigonii tubo tenui limbo duplo vel plus longiore, laciniis anguste ellipticis vel oblanceolatis, obtusis 3 cm. longis, 5 mm. latis, nervis pallide vel intense lilacinis percursis, rare fere albis, fauce glabra. Filamenta alba, 7 mm. longa, antherae luteae 12-15 mm. longae, filamentis longiores. Stigmata pallide aurantiaca, vel aurantiaca, vel raro lutea, in lacinias tenues fissa, staminibus paulo breviora vel sublongiora. $2n = 12$.

Hab. in Monte Hermon et in Cis- et Transjordanica terra-rossa inter saxa calcarea. Floret Septembri-Decembri.

A *C. aleppico* cui tunicis subreticulatis simili differt tunicis secus scapo productis, perigonii, filamentorum et antherarum colore, perigonii laciniis obtusis. Differt a *C. hyemalis* tunicis subreticulatim fibrosis florum colore, laciniis angustioribus, obtusis, antherarum colore, stigmatibus minus fissis et plerumque brevioribus, chromosomorum numero.

Specimens examined : Syria : Sommet de l'Hermon, 15.9.1948 Mousterde. Cis-jordan : Ramallah, among rocks, 11.1945 Feinbrun (HUJ) ; ibid. 18.11.1942 T. Kushnir ; Jerusalem, rocky places 26.11.1914 F. Meyers 4313C sub *C. hyemalis* var. *violaceo-splendens* Bornm. et Dinsm. (K) ; Jerusalem, Sanhedria, 11.1954 D. Yaffe (HUJ). Trans-jordan : Moav, between Medaba and Ziza 3.11.1926 Eig (HUJ) ; El Hummar betw. Amman and es Sueli, 3.11.1926 Eig (HUJ). Hortus Kewensis, coll. Egger, figured for the Herb. Kew 13.10.1903 (K).

12. *C. hyemalis* Boiss. et Bl., Diagn. Ser. II, 4 (1859) : 93.

Syn. *C. hyemalis* var. *foxii* Maw in Boiss. Fl. Or. 5 (1884) : 106.

Icon. : Maw, Monogr. (1886) t. 43 ; Feinbrun, Zohary and Koppel (1949).

$2n = 6$, sometimes with 2 or 4 B-chrom. (Mather 1932, Feinbr.).

Some of the specimens examined : Syria : Plateau près du Wadi Barrada entre Dimas et Damas, 6.1.1853 Gaillardot 306 a (type ! K) ; Liban, Scanderoun N.E. de Saïda Gaillardot (type ! K) ; pr. Sidonem 25.12.1854 Gaillardot (BM) ; Scanderoun, 600-700 n. 1852 Blanche 318 (K) ; Route de Beyrouth, 10.10.1852 Blanche 317 (K) ; Ksar Fassireh près de Saïda 25.12.1854 Gaillardot 306 (K BM) ; Beyrouth Dec. 1866 Haussknecht (BM). Palestine : Hierosolyma Febr. Roth (K) ; Hebron 1863-4 Lowne (K) ; Mt. Carmel Lowne (K) ; near Deir Diwan 1877 Fox (type of var. *Foxii* Maw ! BM) ; Emmaus 18.11.1916 Meyers (K) ; Mt. Gerizim, 11.1941 P. H. Davis (E) ; ad St. Croce extra Jerusalem 23.11.1821 sub *C. candidus* Clark, G. Berggren (K) ; Mt. Gilboa, 11.1923 Eig (HUJ) ; Metulla, 30.11.1924 Eig (HUJ) ; Jerusalem 15.2.1949 Pl. Pal. Exs. 449 (HUJ), and others.

The colour of anthers of this species is a matter of controversy. In its original description Boissier (1859) did not mention the anthers at all. In the *Flora Orientalis* (1884) he described the type with "anthera fuscescente" and "var. *foxii* Maw in litt. Antherae intense nigrae". To the last form he cited the specimen from Deir Diwan¹ collected by Fox which he did not examine. Maw in his *Synopsis* (1881) did not mention var. *foxii* and described the anthers of *C. hyemalis* as "dull orange". In the *Monograph* (1886) Maw figured two specimens of *C. hyemalis*, one with yellow anthers, the other, under var. *foxii*, with dark purple anthers. Baker described the anthers in 1873: "Anthers tinged with lilac", and only later (1892): "Anthers orange".

Since *C. hyemalis* is very common throughout the Mediterranean parts of Palestine, I always wondered what the type of *C. hyemalis* could be, since we knew the form with dark anthers only. It was, however, evident that though Maw apparently was not aware of the common occurrence of his var. *foxii*, he also possessed a specimen with yellow anthers and figured it.

About two years ago I started looking for specimens of *C. hyemalis* with yellow anthers with the result that one of our students, Mr. D. Yaffe, found in two different populations of *C. hyemalis* in Jerusalem (Beth Tsafafa, 12.12.1953 and Talbieh, 4.1.1954) one to two single specimens with yellow anthers, one of which had dark tips. This form is apparently a rather rare mutant of the common form with dark purple anthers.

Since there is no mention of yellow anthers in the original description of Boissier and since examination in the Kew Herbarium showed that at least two of the specimens recorded in the *Diagnoses* and another specimen (by Roth) mentioned in the *Flora Orientalis* possess dark stamens, such as they are well known to us from living material, the conclusion seems warranted that var. *foxii* Maw is identical and synonymous with the original *C. hyemalis*. The very rare specimens with yellow anthers appear singly and sporadically among typical specimens.

C. hyemalis is endemic to Palestine, Syria and Lebanon.

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¹This specimen is given as from "ad pagum Deir Diwan prope Jericho". This is to be corrected, since Deir Diwan is situated in Samaria, about 700 m. a. s., whereas Jericho is 300 m. under sea level, and *C. hyemalis* is not found there.

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The Monocotyledons of the Albert National Park.*—The third volume of Prof. W. Robyns' Flora, published recently, continues in the high standard of production of the two earlier volumes, and deals with the Monocotyledons. With the publication of this volume, Prof. Robyns, who has been assisted in the preparation by M. Roland Tournay, completes his account of the known seed-bearing plants of the Albert National Park in the Belgian Congo.

Of the 544 pages devoted to the systematic treatment of 27 families, no fewer than 400 cover 3 of the families, namely *Gramineae* (185), *Orchidaceae* (131) and *Cyperaceae* (84). Of the remaining 24 families, half of them are

* Flore des Spermatophytes du Parc National Albert : III—Monocotylées par Walter Robyns avec la collaboration de Roland Tournay, Bruxelles, 1955, pp. 571, with 1 coloured plate, many illustrations and 1 map.

represented by one genus alone, and of the remaining 12, one only (*Liliaceae*) has more than ten genera.

Considering the very great range of altitude and variation in vegetational types in the Albert National Park, one is surprised to find that some families are so poorly represented, for instance *Xyridaceae* with only one species of *Xyris*, *Eriocaulaceae* with only one species of *Eriocaulon*, and *Hydrocharitaceae* with but *Vallisneria aethiopica*. Can it be that volcanic action has greatly impoverished the flora, or is there yet a good deal more collecting to be done ?

The systematic order of Engler has been followed throughout for arranging the families. The 77 genera of the *Gramineae* have been arranged in tribes mainly after an original scheme devised by M. Tournay from that of C. E. Hubbard in J. Hutchinson's *British Flowering Plants* (1948). M. Tournay has, however, largely reversed the sequence proposed by Hubbard. In *Cyperaceae*, Kükenthal's treatment has been followed, and *Juncellus*, *Pycnus*, *Mariscus* and *Kyllinga* lost as subgenera in the great mass of *Cyperus*. A broad view has been taken of *Scirpus*, whilst *Abildgaardia* Vahl has been revived for the anomalous species, *Fimbristylis monostachya* (L.) Hassk. *Liliaceae* follows Krause, with *Dracaena* remaining therein but with *Sansevieria* taking its rightful place next to it, while *Amaryllidaceae*, contrary to the usual practice of today, includes the *Hypoxidoideae-Hypoxideae*.

Volume III is illustrated both by line drawings by A. Cleuter, and by half-tone blocks from photographs of living plants in the field. The reproduction of some of these latter probably does not do justice to the original photographs. Among the line drawings are some beautiful portraits, but quite a number have the unmistakable signs of having been prepared from dried and pressed material. The articulations in the scape of *Cyperus articulatus* (plate XXX, p. 227) are clearly portrayed (as indeed they are in F.W.T.A. 2, fig. 346), whilst in the fresh state they are completely invisible. The coloured frontispiece is from a fine painting of *Polystachya kermesina* by Mrs. Joy Adamson.

The volume contains keys and short supplementary descriptions of all the species of Monocotyledons known to occur in the Park, and is provided with a good index, whilst at the end there is a statistical summary of the seed-bearing plants of the Albert National Park contained in this work, which shows a total of 1,959 species, and the same map as was provided with the earlier volumes is also included. It should, together with the earlier volumes, prove a useful handbook for those, living in the adjacent parts of western Uganda, who are anxious to know more about their local flora, as well as to the many visitors to this world-famous National Park.

E. MILNE-REDHEAD.

SOME MARASMIOID FUNGI ALLEGEDLY PARASITIC ON LEAVES AND TWIGS IN THE TROPICS.

R. W. G. DENNIS and D. A. REID

The present paper is the outcome of an attempt to name a fungus on *Hevea* leaves sent from Malaya with the tentative determination *Cyphella heveae* Masee. It was soon found that this name had been based on a Discomycete which is redescribed below and transferred to the genus *Dasyscyphus*. As the Malayan fungus was a Basidiomycete it became necessary to compare it with the various species of marasmiod thread-blights recognised by Petch in Ceylon and West Africa. In our view Petch's identifications were in some instances unsound and the opportunity has therefore been taken to redescribe the marasmiod thread-blight fungi and at the same time to propose a name for an apparently undescribed fungus associated with leaf-spots of Leguminosae in West Africa.

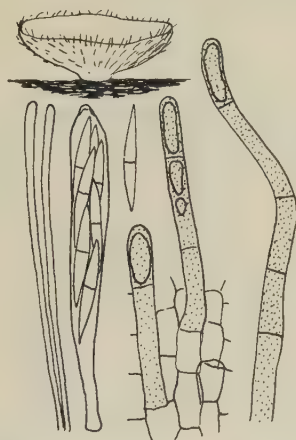


FIG. 1. *Dasyscyphus heveae*. Habit sketch $\times 50$, details $\times 660$.

***Dasyscyphus heveae* (Masee) Dennis et Reid, comb. nov.**

Cyphella heveae Masee in Kew Bulletin 1914, p. 157.

Apothecia scattered, superficial, cupshaped on a small base, 300–500 μ diameter, drying light yellowish throughout. Excipulum soft and delicate, composed of thinwalled prismatic cells 8–11 \times 5–7 μ arranged in vertical series, bearing numerous thinwalled, septate, cylindrical, hyaline to pale yellowish hairs, up to 80 \times 5 μ , with rounded tips, finely granulate walls and somewhat oily contents in the apical cells. Asci cylindrical-clavate, 8-spored, 65 \times 7 μ ; ascospores irregularly biserial, narrowly fusiform, pointed at each end and sometimes markedly tapering below, 20–26 \times 2.5–3 μ , consistently 1-septate; paraphyses numerous, cylindrical, rounded at the tip, about 2 μ thick.

On twigs of *Hevea*, Prov. Wellesley, Malaya. Fig. 1.

The bark bears neither rhizomorphs nor white mycelial strands and it seems improbable the fungus is connected with a thread-blight or in any way parasitic. Nearly all the apothecia in the type collection have the hymenium destroyed, presumably eaten out by insects, so that it is not surprising Masee did not find asci and assumed the species to be a *Cyphella*. It is noteworthy he made no mention of basidia in his diagnosis.

Marasmius cyphella *Dennis et Reid, sp. nov.*

Pileus 1.5–5 mm. lata, tenui-membranaceus, reniformis, non-lamel-latus, superne olivaceo-brunneus, infra cremeus; stipes lateralis inchoatus; pelliculae celluli ovoides-rotundati, saepe bifurci, papillis hyalinis vel bruneis; basidia clavata, $23.4\text{--}28.6 \times 4.5\text{--}7\mu$; sporae ellipsoidea, hyalinae, non-amyloideae, $7\text{--}8 \times 3.5\text{--}4.5\mu$; mycelium rhizomorphaeum album.

Ad folia et ramos Heveae, Malaya, IMI No. 67980 (TYPUS).

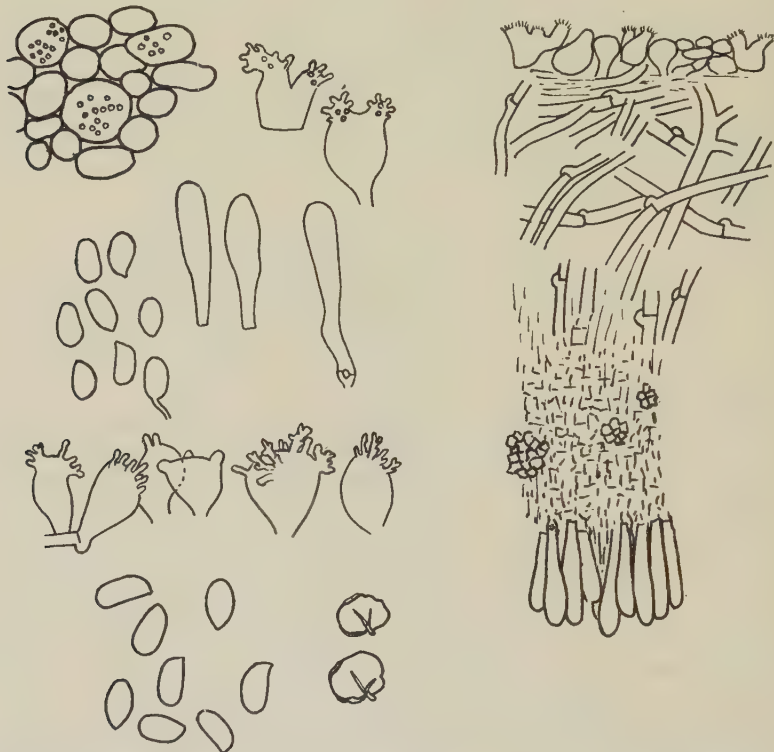


FIG. 2. *Marasmius cyphella*. On right, section of pileus $\times 400$; top left, details $\times 860$; lower left, details of the similar fungus from Ashanti called *M. scandens* sensu Petch $\times 860$.

Pileus 1.5–5 mm. in diameter, thin membranaceous, reniform, non-lamellate, and attached to the substrate by a rudimentary lateral stipe. In dried specimens the hymenial surface is cream coloured and the upper surface olivaceous brown.

A section through the carpophore shows a cellular cuticle with scattered, frequently bifurcate, cystides en brosse ($10\text{--}11 \times 9\text{--}10\mu$). Beneath this is a zone of loosely woven, branched, septate, clamped, hyaline hyphae, $2.5\text{--}5\mu$ in diameter, followed by a layer containing crystalline masses and in which the hyphae are very densely compacted and difficult to distinguish. From the latter region arise the clavate basidia, $23.4\text{--}28.6 \times 4.5\text{--}7\mu$, which have basal clamp connections. The spores, $7\text{--}8 \times 3.5\text{--}4.5\mu$, are thin-walled, hyaline, elliptical and non-amyloid. Fig. 2.

Infected leaves and twigs of the host plants are covered with conspicuous, white, thread-like, mycelial strands. These consist of thick-

walled, unbranched hyphae, $2.5-3\mu$ in diameter, which stain deeply in analine blue in lactic acid and also thin-walled hyphae, $2-6\mu$ in diameter, which are branched, septate, clamped, and unstained.

The fruitbodies are produced on the undersides of the old leaves of *Hevea*, and less commonly on the twigs. In dried material the carpophores become pressed against the surface of the leaves and appear almost sessile. Although the fructifications are not actually borne in contact with the white thread-like strands of the mycelium, field observations suggest that they are found in constant association with a thread-blight. In addition cultures taken from both carpophores and mycelial threads are similar in all respects. It thus seems virtually certain that *M. cyphella* is the fructification of the fungus causing thread-blight of *Hevea* in Malaya.

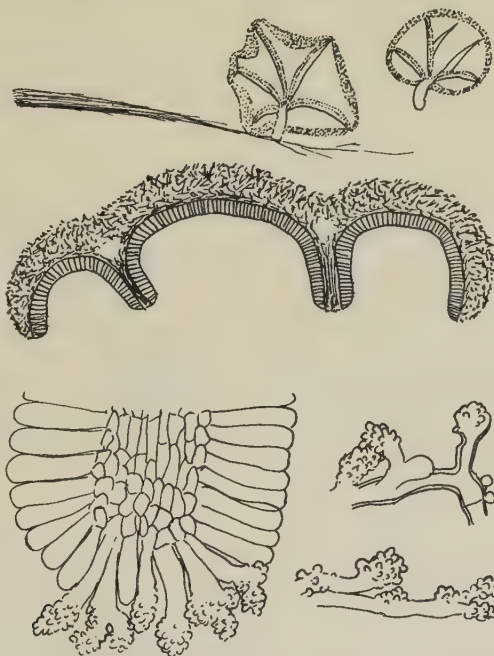


FIG. 3. *Marasmiellus scandens*. Habit sketch $\times 12$, diagrammatic section $\times 100$, section of gill edge and coralloid hyphae of the pileus $\times 660$.

There is a collection in the Kew Herbarium, determined as *M. scandens* sensu Petch (Ashanti, coll. Hewison, June 1923), which differs from *M. cyphella* in having the hymenium thrown into two diverging gill-like folds, slightly larger spores ($7-8-9 \times 3-4.5\mu$), more numerous cystides en brosse with coarser brownish papillae on the surface of the pileus, and a thinner zone of densely compacted hyphae above the hymenium.

As the spores in *M. cyphella* were scanty it is possible that they were immature and therefore rather small. The remaining differences seem to be differences of degree rather than of kind and so it seems best not to describe the West African collection as a new species unless further collections confirm its distinctness from *M. cyphella*.

Marasmiellus scandens (Masse) Dennis et Reid, comb. nov.

Marasmius scandens Masse in Kew Bull. 1910, p. 1.

Marasmius byssicola Petch in Trans. Brit. Myc. Soc. **13**, 143 (1928).

Carpophores up to 1.5 mm. diameter, orbicular to slightly reniform, laterally stipitate and reflexed so that the upper surface of the pileus is adpressed to the substrate; stipe cylindrical, curved, very short, dark brown, pruinose; upper surface of pileus white-pruinose, composed of coralloid nonamyloid hyphae $4-5\mu$ wide, trama of loosely woven non-amyloid hyphae of similar width, hymenium pale ochraceous, drying brown, gills narrow, up to 5 in number, occasionally forked, with white-pruinose margins composed of hyaline, coralloid, hyphae tips. Spores unknown.

Carpophores may arise from whitish to pale buff ropes of parallel hyphae or may spring directly from the substrate.

On dead leaves of *Cacao*, Kyerepatra, Gold Coast, 8.4.1925, *R. H. Bunting* 213, typus of *M. byssicola*. Fig. 3.

The type material of *M. scandens* has not been preserved but Masee's diagnosis and figure apply much more closely to the present species than to the fungus so called by Petch, see *Marasmius cyphella*, above.

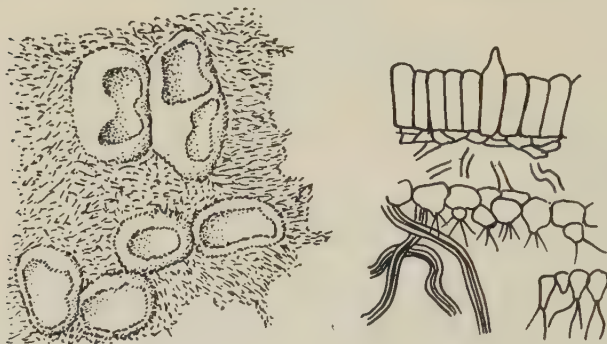


FIG. 4. *Marasmius pulcher*. Habit sketch $\times 12$, section of pileus and 4 broom cells $\times 660$, from the type collection.

Marasmius pulcher (Berk. & Br.) Petch in Ann. Roy. Bot. Gard. Peradeniya 9, 21 (1924).

Cyphella pulchra Berk. & Br. in J. Linn. Soc. Bot. 14, p. 74, 1875.

Carpophores borne usually in compact clusters on patches of white, pseudo-amyloid, thickwalled hyphae, $2-2.5\mu$ in diameter, resupinate, saucer-shaped, non-lamellate, the attached portion delimited from the subiculum by a thin layer of pseudoamyloid hyphae, the free margins slightly recurved and white. Small, subglobose, strongly pseudoamyloid cells occur, apparently as outgrowths from the cuticular hyphae, both on the free margins and among the subicular hyphae of the basal portion of the carpophore and are conspicuous by their very long (up to 10μ) and slender pseudoamyloid processes, like those of *Marasmius pseudo-arachnoideus* Dennis. Trama thin, hymenium cream coloured, smooth, composed of short cylindrical basidia and fusiform basidioles. Spores elliptical with prominent apiculus, hyaline, nonamyloid, $7.5-9 \times 4-4.5\mu$. Pseudoamyloid cells with similar long slender processes also occur among the subicular hyphae, with which their relationship is not clear, though Petch described them as terminal on very slender, much-branched, lateral hyphae.

On bark, Ceylon, *Thwaites* 368. Fig. 4.

Petch assigned to the same species a number of collections of minute stipitate *Marasmius* with clearly developed gills. Some of these, notably those he cited on *Garcinia*, certainly belong to another species but one of his collections on tea wood bears pseudo-amyloid broom cells like those of the type and may possibly belong here. A brief description of this follows :

Free-standing carpophores orbicular or reniform, laterally attached by a conical pad of white pseudoamyloid mycelium, lamellae few, feebly developed, radiating from the point of attachment. The upper surface of the fruit body is covered with hyphae bearing short rounded processes and not at all pseudoamyloid. Interspersed with these may be branched hyphae 2-3 μ wide, whose slightly clavate tips have pseudoamyloid walls and bear long slender processes like those of the resupinate carpophores. Trama thin, not stained by iodine, hymenium like that of *M. pulcher*.

On branches of *Camellia sinensis*, Peradeniya, Ceylon, Dec. 1922, associated with a thread-blight mycelium, Figs. 5 and 6.



FIG. 5. Free standing carpophores referred by Petch to *M. pulcher*. Habit sketch $\times 12$, broom cells from the upper surface $\times 660$.

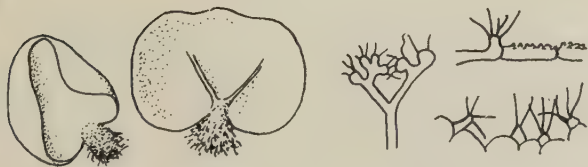


FIG. 6. Four broom cells from mycelium $\times 860$.

The possibility has to be considered that the pseudoamyloid cells associated both with the pilei and the mycelium belong to some hyperparasite. Against such a hypothesis is their microchemical reaction, normal in the *Marasmius-Crinipellis* alliance, and their restricted distribution on the pilei, where they can apparently be seen to arise from normal hyphae of the basidiomycete. For the present we accept them as belonging to *Marasmius pulcher* and as supporting Petch's hypothesis that this fungus occurs in both resupinate cyphelloid and stipitate marasmoid phases. It is desirable, however, that this hypothesis be tested by culturing from both types of carpophore and attempting to produce both type of fructifications from the same culture.

Marasmius cymatelloides *Dennis et Reid, spec. nov.*

Pileo primo conico dein expanso, glabro, sicco, stramineo, 1 mm. diametro. Lamellis obsoletis. Stipite laevi, terete, concolore, curvato; mycelio basali albo. Epicute pilei hymeniformi; carne membranacea, haud gelatinosa, alba, ex hyphis hyalinis, fibuligeris, pseudoamyloideis constructa; basidiis clavatis, $30-50 \times 8\mu$; sporis ellipsoideo-subfusoideis, hyalinis, laevibus, inamyloideis, $16-19 \times 4.5-6\mu$; cystidiis nullis.

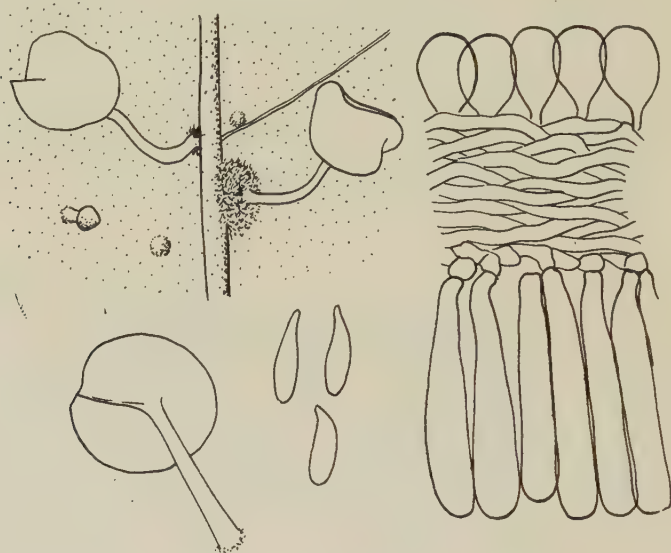


FIG. 7. *Marasmius cymatelloides*. Habit sketches $\times 12$; section and spores $\times 660$.

Hab. in foliis *Baphiae pyrifoliae* (Leguminosae), per areas mortuas zonatim maculatas sparsus, Njala, Sierra Leone, 9.2.1954, *F. C. Deighton* M 5625 B, Typus. Fig. 7.

A morphologically indistinguishable fungus occurs on leaf spots of *Leptoderris fasciculata* but on this host the spots are not zonate, compare for example Deighton M 702, Njala, 25.5.1935.

A NEW SPECIES OF MARSILEA FROM POONA, INDIA.

G. G. KOLHATKAR

The life history of a species of *Marsilea* occurring at Poona was studied by the author and its important features were published (Kolhatkar, 1937). This species, on consulting the literature, appeared to be new, as it was not comparable with the description of any of the species given by Baker and Hooker (1887) or Engler and Prantl (1902). At our request, therefore, Mr. F. Ballard of the Royal Botanic Gardens, Kew, went through all the specimens of this genus at Kew and confirmed it to be new, and suggested that it be called *M. poonensis* n. sp. The description of the type, and a Latin description, however, were not given when the above paper was published and hence they are given below to make the account of the species valid and complete.

Description.

Plants 1–30 cms. according to the habitat, having dorsiventral stems running along the bottom of the ponds or trailing on the adjacent ground. These produce leaves varying in shape, either toothed or not toothed. The length of the petiole 4–25 cms. long, depends upon the habitat, aquatic or dry. The growing points of the rhizome and young leaves are covered with multicellular hairs. The length of stem and internodes is variable, the stem varying in length from 1–30 cms. The margin of the leaves varies from entire to toothed, depending upon the ecological conditions. Adventitious roots arise in groups of 2–3 at each node; 2–3 sporocarps appear at each node in the dry season and are quite separate from each other; they are not attached to the petiole as in *M. quadrifolia*. They are 4.5 mm. long \times 3.5 mm. broad \times 2.5 mm. thick. The stalk of the sporocarp is very short and slender; ribs prominent; spines two, the lower one short and blunt, the upper one long and pointed. The capsule is broadly ellipsoid in outline, dark-brown when fully matured, green when young and covered with hairs; valves 2, each containing 5–7 sori united by their edges and recognizable by their dorsal and ventral sutures; the dorsal suture is short. Each sorus contains 6 megasporae and numerous microsporae. Megasporae ovoid, 0.9 mm. \times 0.7 mm. Microsporae spherical, 0.06 mm. in diameter.

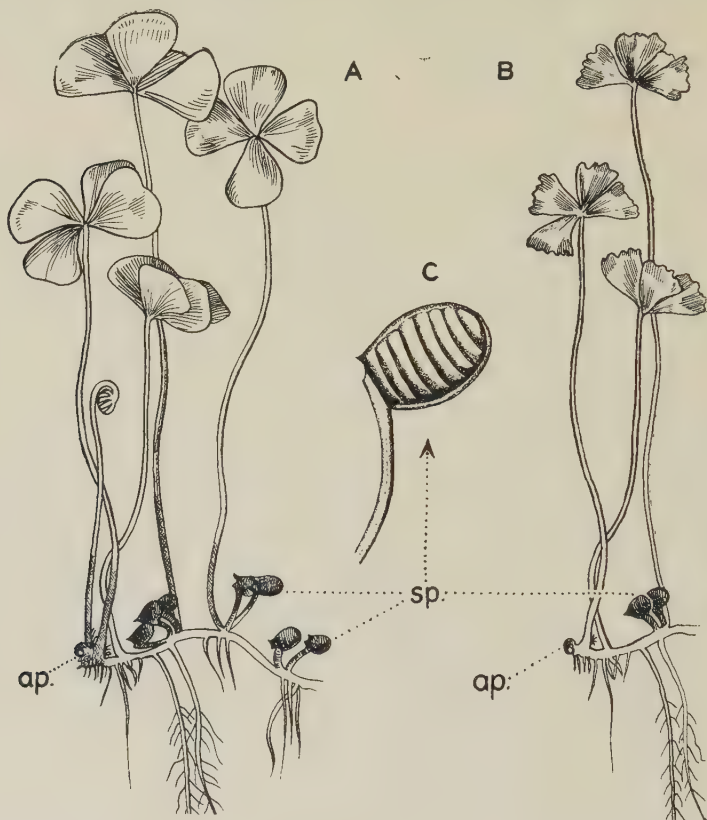
Locality:—Poona; riverbanks or ditches adjoining them.

Collector:—G. C. Kolhatkar, March, 1937.

The type specimens are deposited in the Herbarium of the University of Poona and duplicates are deposited in the Herbarium of the Royal Botanic Gardens, Kew.

Marsilea poonensis Kolhatkar, sp. nov. Plantae 1.0–30 cm. longae, culmo dorsiventrali decurrente in fundo lacunarum vel per humum eis adjacentem, et producente folia forma variabili, longitudine petiolorum et laminarum ex habitatione plantae dependente. Petioli 4–25 cm. longi aquatici vel aerii. Apices crescentes et folia juvenilia pilis multicellularibus operta. Longitudo culmorum atque spatiorum inter-

nodalium variabilis est, culmorum quidem longitudo variat inter 1 et 30 cm. Foliolorum margines integri vel dentati, pro conditionibus ecologicis variis. Radices adventitiae binae vel ternae ad unumquemque nodum; tempore sicco bina vel terna sporocarpia producuntur ad singulos nodos sed inter se distincta, nec petiolo adnata sunt. Sporocarpia 4.5 mm. \times 3.5 mm. \times 2.5 mm.; eorum pediculus brevissimus est et tenuis, costis prominentibus; spinulae binae, quarum inferior brevis et hebes, superior vero longa ad acuta. Capsula late ellipsoidea in ambitu, maturitate, fusco-brunnea, juventute viridis et pilosa. Valvulae binae, quarum singulae 5–7 soros continent, marginibus fuis, distinguendae vero suturis dorsalibus et ventralibus. Sutura dorsalis brevis.



Marsilea poonensis Kolh. A, B, habit, nat. size; C, sporocarp, \times 5. ap. = stem apex; sp. = sporocarp.

Sporocarpium quodque 6 megasporas continet, plures microsporas; megasporae late oblongo-ellipticae in ambitu, 0.9 mm. \times 0.7 mm.; microspora vero rotundatae, 0.6 mm. diam. Typus lectus in urbe Poona, mense martio anni 1937, a G. G. Kolharkar, et positus in Herbario Universitatis Poonensis sub numero *Marsilia poonensis* Kolhat. M. 20/1956.

Identification.

Out of the 40 species recorded by Baker and Hooker (1887) three only are somewhat similar to this plant. But none of them, namely *Marsilia*

quadrifolia, *M. minuta* and *M. erosa*, agrees with it. It is not *M. quadrifolia* as there are 16–20 sori in its sporocarps ; nor has it pellucid dots on the areolae of the leaf. It is not *M. minuta* as there are 10–12 sori in the sporocarp. Besides, in both these species, the pedicel is connate or adnate to the petiole, but not so in the present species. It does not tally with any of the species described by Engler and Prantl (1902) either. *M. erosa* and *M. diffusa* belonging to Engler's subgroup Ba approach this in certain respects, but the capsules are not ribbed in *M. diffusa*, nor are the leaves toothed as in this species. It is also not *M. erosa* as the number of sporocarps at each node in this species is mostly 2 and not 3 as in that species. It is also not comparable with any of the other species or varieties described by them. Taking all these facts into consideration, there is little doubt that this species is new.

Acknowledgements.

My thanks are due to Father H. Santapau S.J. for rendering the Latin diagnosis and to Mr. F. Ballard for comparing my specimens with those in the Kew herbarium. I am indebted to Dr. T. S. Mahabale for helpful criticism and encouragement.

References.

- Baker, J. G. (1887). *The Fern Allies*.
 Engler & Prantl (1902). *Die Natürlichen Pflanzenfamilien*, I(4), p. 403.
 Kolhatkar, G. G. (1937). "Life history of *Marsalia* from Poona", *Journ. Bombay University*, Vol. 5 (5), pp. 19–37.

Florists' Auriculas and Gold-laced Polyanthus.*—Literature on the auricula is by no means plentiful. We are told in the preface to this book that there does not appear to have been any book dealing exclusively with the cultivation of the auricula. In 1951, however, a book on the auricula by the late Sir Rowland Biffen appeared, its main object being to describe the author's efforts to discover the origin of the plant. The present work deals with the cultivation of the auricula. The author, a noted grower and breeder of show auriculas, deals with his subject in a competent manner. Here he discusses the early auriculas, devotes a chapter to the description of the plant, then goes on to deal with its general cultivation, raising new varieties, standards of perfection, exhibiting, varieties, pests and diseases, etc., ending with a chapter on the gold-laced polyanthus and the old florists. The publication is well illustrated by photographs and line drawings and provided with an index. There can be no doubt that this book will do much to encourage the cultivation of these plants which are among the oldest of our florists' flowers.

H. S. MARSHALL.

* Florists' Auriculas and Gold-laced Polyanthus. By C. G. Haysom. London : W. H. & L. Collingridge Ltd. New York : Transatlantic Arts Inc. 1957. Pp. 84. illus. 30/-.

NOMENCLATURAL NOTES: I

A. A. BULLOCK

The generic name *Goldbachia* was published twice, for different genera, in 1821 and the exact dates of publication have not been determined.

Goldbachia DC. Syst. Veg. 2 : 576 (May 1821) is a genus of *Cruciferae* and the name has been adopted in the relevant literature by most authors. *Goldbachia* Trinius* (in Sprengel, Neue Entdek. 2 : 42. 1821), a genus of *Gramineae* has not been generally adopted and as early as 1828 Reichenbach, granting priority to De Candolle, changed the name to *Calamochloe* ; both names are now regarded as synonyms of *Arundinella* Raddi (1823).

All these names were validly published and it is clear that if *Goldbachia* Trinius did in fact appear before De Candolle's name, then the latter will require either conservation or a new name. The only contemporary notice of Trinius's paper I have found is in Flora, 4 (Dritte Beilage) : 78, which was published during the first half of 1821. Unlike the regular fortnightly parts of the main work, however, the title page of the Beilage is undated. For the date May 1821 for De Candolle's work I have relied upon Stearn's bibliographical note in the Journal of Botany (79 : 25-27. 1941).

Agrostologists will wish to preserve the name *Arundinella* Raddi which on taxonomic grounds should be replaced by *Goldbachia* Trinius if the latter has priority over *Goldbachia* DC., and the simplest way to do this, and at the same time resolve the doubt as to priority, is to conserve *Goldbachia* DC.

Incidentally, *Calamochloa* Fourn. (1877), revised recently by Sohns (Journ. Washington Acad. Sc. 46 : 109, 1956) must be regarded as a later homonym (orthographic variant) of *Calamochloe* Reichb. (1828), and requires a new name, whilst *Calamochloe* Reichb., will, with conservation of *Goldbachia* DC., become the correct name for *Goldbachia* Trinius if the latter is regarded as a genus distinct from *Arundinella* Raddi.

* *Agrostographische Beyträge*, pp. 33-94 ; *G. mikanii* Trinius, the only species, is described fully on pp. 81-83, thereby amplifying the generic diagnosis given on p. 42.

Achyranthes : a correction

I am indebted to Mr. J. E. Dandy, Keeper of Botany, British Museum, for drawing my attention to the fact that the combination *Alternanthera repens* (Linn.) was first validly published by Link, Enum. Pl. Berol. 1 : 154 (1821), not by Kuntze, as indicated in Kew Bull. 1957 : 73 (1957).
—A. A. BULLOCK.

FURTHER NOTES ON TROPICAL AMERICAN XYLARIACEAE.

R. W. G. DENNIS

The present paper is a continuation of that published in Kew Bulletin 1956, pp. 401-444 and includes additions to the synonymy of species described therein, notes on a few further rare or critical species of *Xylaria* and an account of the other genera with erect perithecial stomata which have from time to time been confused with *Xylaria*.

It is to be feared that the holotypes of the many species of *Xylaria* described by P. Hennings were lost in the destruction of the Berlin herbarium during the last war. Fortunately small portions of several of the type collections passed into the hands of Bresadola, Rehm or Sydow and are now preserved with their herbaria in the Naturhistoriska Riksmuseet, Stockholm, whence I have been privileged to borrow them for study. Material of most of Fries' species still exists at Uppsala and has been kindly sent me on loan by Prof. Nannfeldt. Prof. Cappelletti has similarly been so good as to send Saccardo's *Xylarias* on loan from Padua and Dr. Rogers some of Ellis and Everhart's species from New York Bot. Gardens. Examination of this additional material enables me to supplement the synonymy given in my former paper as follows:—

Xylaria amazonica P. Henn. in Hedwigia **43**, 261 (1904).

Brasil : Estado da Amazonas, March 1902, leg. E. Ule = *X. comosa* (Mont.) Fr.

Xylaria bacillaris Rehm in Leaflets of Philippine Botany **6**, 2212 (1914).

The type collection, from the Philippines, is *X. arbuscula* Sacc.

Xylaria brachiata Sacc. in Ann. Mycol. **4**, 75 (1906).

The type collection, from the Congo, is *X. arbuscula* Sacc.

Xylaria brevipes Sacc. & Fairm. in Journal of Mycology **12**, 47 (1906).

U.S.A. : ad truncos dejectos pr. Lyndonville, New York, 1905 = *X. feejeensis* (Berk.) Fr.

Xylaria cylindrica Ell. & Ev. in Bull. Lab. Nat. Hist. State Univ. Iowa **2**, 414 (1893).

Nicaragua : on bark, Ometepe, Lake Nicaragua and Castillo Viejo, Rio San Juan, C. L. Smith, 1893.

According to the diagnosis the ascospores measured $8-10 \times 3.5-4\mu$, which suggests the fungus was *X. multiplex*. The type packet at New York, however, contains only a single broken stroma, agreeing externally with the diagnosis but yielding ascospores $11-14 \times 4-5.5\mu$. This is evidently the unbranched state of *X. arbuscula* Sacc. The type collection was a mixture from two localities and perhaps included examples of both species.

Xylaria fastigiata Fr. in Nov. Acta Reg. Soc. Sci. Upsal. Ser. 3, **1**, 127 (1851).

Costa Rica : leg. Örsted, in Herb. Fries, yields ascospores $9.5-10 \times 4.5\mu$ and appears to be an obtuse-tipped state of *X. multiplex* (Kze.) Fr.

Xylaria gomphus (Fr.) Fr. in Nova Acta Reg. Soc. Sci. Upsal. Ser. 3, **1**, 127 (1851).

Sphaeria gomphus Fr. Elenchus Fungorum **2**, 52 (1828).

Brasil : ad basin truncorum, leg. Lund. The holotypus in Herb. Fries is a completely immature specimen of some *Xylaria* in Group 8, having a black crust devoid of ostioles. It may be *X. poitei* (Lev.) Fr. but the name is to be rejected as based on a specimen too immature for adequate description or subsequent recognition.

Xylaria huberiana P. Henn. in Hedwigia **41**, Beiblatt p. (17), 1902.

Brasil : auf morschem Holze, Para, July 1895, Huber 56 = *X. anisopleura* (Mont.) Fr.

Xylaria morchelliformis Rehm in Ann. Mycol. **9**, 371 (1911).

The typus, from Hawaii, is *X. scruposa* sensu Montagne.

Xylaria ophiopoda Sacc. in Ann. Mycol. **4**, 74 (1906).

The typus, from the Congo, is *X. polymorpha* (Pers. ex Fr.) Grev.

Xylaria pallide-ostiolata P. Henn. in Engler's Bot. Jahrb. **38**, 128 (1905).

The type collection, from the Cameroons, is *X. scruposa* sensu Montagne.

Xylaria papyrifera (Link) Fr. in Nov. Acta Reg. Soc. Sci. Upsal. Ser. 3, **1**, 126 (1851).

Sphaeria papyrifera Link apud Fries in Linnaea **5**, 536 (1830).

Brasil : ad basin truncorum, leg. Beyrich. The fragments of the holotypus in Herb. Fries yield ascospores $15-17 \times 4-5.5\mu$ and show this to be the legitimate name for *X. allantodea* (Berk.) Fr.

Xylaria paraensis P. Henn. in Hedwigia **41**, Beiblatt p. (17), 1902.

Material in Herb. Sydow at Stockholm, leg. Huber, April 1891, Para, is a state of *X. hyperythra* (Mont.) Fr. with rather larger ascospores than usual, viz. $18-23 \times 5-9\mu$.

Xylaria protea Fr. in Nov. Acta Reg. Soc. Sci. Upsal. Ser. 3, **1**, 125 (1851).

Costa Rica : ad truncos, leg. Örsted, the holotypus in Herb. Fries = *X. polymorpha*.

Xylaria reducta Syd. in Ann. Mycol. **5**, 339 (1907).

The type collection, from Tanganyika = *X. cubensis* (Mont.) Fr.

Xylaria rugosa Sacc. in Ann. Mycol. **4**, 74 (1906).

The type collection, from the Congo, is *X. polymorpha*, in the state called *X. schweinitzii* Berk. & Curt.

Xylaria subgracillima P. Henn. in Hedwigia **43**, 262 (1904).

Brasil : morschen Stämmen, March 1902, Marmellos, Rio Madeira, E. Ule 2871, portion in Herb. Sydow. This is the small unbranched state of *X. coccophora* Mont., which is possibly the original *Sphaeria gracillima* Fr.

Xylaria subinvoluta von Höhnelt in Denkschr. Ak. Wiss. Wien, Math.-Naturw. Kl. **83**, 27 (1927).

Brasil : in silva primigenia, ad truncos putridos, prope Raiz da Serra, Sao Paulo, 20-50 m.s.m. 4.6.1901, Schiffner & Wettstein 4371, in Herb. Bot. Inst. Univ. Wien = *X. cubensis*.

Xylaria subtrachelina P. Henn. in Hedwigia **43**, 207 (1904).

Brasil : ad truncos, Serra da Cantaneira, Para, April 1903, Puttemans 815, part of the type collection in Herb. Sydow, Stockholm ; in ligno frondoso, Sao Leopoldo, 1908, Rick, Fungi Austro-Americani 238. Both are *X. multiplex*.

Xylaria torquescens Sacc. in Ann. Mycol. **4**, 74 (1906).

The type collection, from the Congo, is *X. grammica* (Mont.) Fr.

Xylaria variabilis Welw. & Curr. in Trans. Linn. Soc. **26**, 280 (1868).

The holotypus, from Angola, in Herb. Brit. Mus., is sterile but appears to be young *X. grammica*.

The following species of *Xylaria* are additional to the tropical American species described and figured in my previous paper ; the first four obviously belong to group 6 and are closely akin to well-known species.



FIG. 1. *Xylaria adscendens*. Right, the holo type at Uppsala ; left from Trinidad.

Xylaria adscendens (Fries) Fries in Nov. Acta Reg. Soc. Sci. Upsal. Ser. 3, **1**, 128 (1851).

Sphaeria (*Cordyceps*) *adscendens* Fries in Linnaea **5**, 537 (1830).

Xylaria cristulata Lloyd in Mycological Notes 5, *Xylaria* Notes p. 31, 1918.

Stromata erect, with a subcylindrical, wrinkled, black stalk, surrounded at the base by a dense pad of mycelium, becoming flattened and repeatedly forked above, with whitish tips ; surface at first finely felted, becoming smooth and splitting slightly ; perithecia distributed over the flattened portions of the stroma, immersed or very slightly protruding by shrivelling of the white flesh, ostiolar papillae discoid, slightly convex, ascospores $9-11 \times 4-5\mu$. Fig. 1.

Collections seen :

Brasil : in truncis demortuis prope Tijuca, Majo, Beyrich, holotypus in Herb. Fries.

Trinidad : leg. *Broadway* 1909 and determined by *Bresadola* as *X. dichotoma* (Mont.) Fr.

Cuba : *Wright* 292 ; 591.

Theissen treated this as a state of *X. hypoxylon* (L. ex Fr.) Grev., with which it is certainly closely allied, but the conidial stromata in tropical collections referred here lack the sharp contrast between white tips and a shaggy black stalk shown by European material of *X. hypoxylon*. Fries' specimen has only immature perithecia and the ascospores are cited from *Broadway's* collection which has a similar stature and is itself scarcely mature. Theissen found them a little larger, $11-16 \times 4-5\mu$, in Brazilian material. If he is right then the following fully mature collections with ascospores $13-15 \times 1-5.5\mu$ may also be assigned here :—

Jamaica : *Newhaven Gap*, Blue Mountains, *Amy Barry*, May 1945.

Venezuela : *Fendler* 248.

Mexico : No. 42, locality and collector unknown.

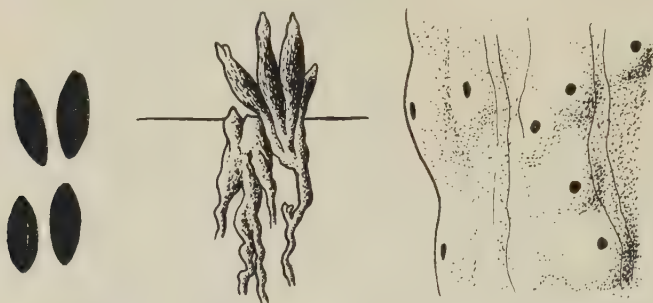


FIG. 2. *Xylaria deserticola*, habit sketch natural size, details enlarged.

Xylaria deserticola Speg. in An. Mus. Nac. Buenos Aires **8**, 70 (1902).

Stromata with deeply rooting, much branched, strap-like, subterranean bases ; above-ground portions cylindric-fusiform, short, about 4 mm. thick, with more or less pointed whitish tips ; crust thin, black, smooth, showing traces of a paler superficial layer which has split and peeled off, becoming wrinkled round the immersed perithecia ; ostioles small, discoid, not at all papillate ; flesh white, solid ; ascospores fusiform, brown, subtranslucent, $16-18 \times 5-7\mu$. Fig. 2.

Argentina : " Ex fissuris soli exsurgens (e radicibus certe oriunda) ", Sierra de los Himanes, S. Juan, April 1910, leg. *S. Venturi*, Herb. Spegazzini.

This has somewhat the habit of *X. digitata* (L. ex Fr.) Grev. but lacks the massive base of that species. In surface characters it is very close to *X. hypoxylon* but has larger ascospores, European *X. hypoxylon* has ascospores $11-15 \times 5-6\mu$.

Xylaria euphorbiicola Rehm in Hedwigia **40**, 147 (1901).

Stromata solitary, with long, smooth, slender stalk and well defined cylindrical fertile portion, $7-8 \times 2.5$ mm., with short pointed tip ; crust smooth, not split but bearing traces of a former gray-brown surface layer

which has stripped off ; ostiolar papillae small and only slightly convex ; asci narrowly cylindrical, 5μ wide, with apical ring blued by Melzer's reagent, 8-spored ; ascospores black, $8-10 \times 4-5\mu$.

Brasil : ad fructus Euphorbiae, Serra do Bien, January 1896, *Ule* 2502, in Herb. Rehm.

Rehm was mistaken in giving the iodine reaction as "Porus J—", which would be quite exceptional in a *Xylaria*. Obviously this little fungus is very close to *X. multiplex*. It seems possible it may be a distinct species confined to Euphorbia fruits, just as *X. palmicola* Wint. is said to be confined to palm fruits, and *X. oxyacanthae* Tul. to *Crataegus* fruits, but its status requires confirmation by more extensive collecting and field observations in South Brasil. Fig. 3.



FIG. 3. *Xylaria euphorbiicola*, habit sketch natural size, apex of stroma enlarged.



FIG. 4. *Xylaria smilacicola*, immature and mature stromata $\times 14$.

***Xylaria smilacicola* Speg.** in An. Mus. Nat. Buenos Aires **19**, 348 (1909).

Stromata solitary or in pairs with a common base, about 5 mm. high, stalk short, smooth, strap-like, base discoid, fertile portion short, cylindrical with a pointed tip, outline rendered irregular by the slightly protruding perithecia ; crust black, smooth, striped with remnants of the superficial stratum, ostiolar papillae minute, slightly convex ; ascospores $16-19 \times 7-8\mu$. Fig. 4.

Argentina : on dead *Smilax* branches, Parque Roca, Tucuman, 15.4. 1906, Herb. Spegazzini. This is clearly closely akin to *X. apiculata* Cooke.

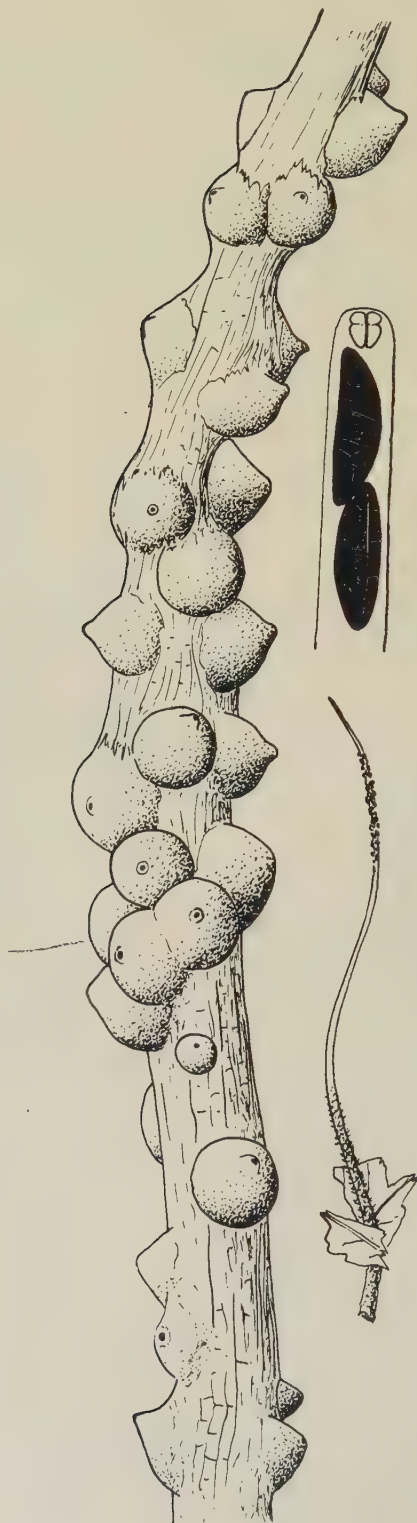


FIG. 5. *Xylaria theissenii*, habit sketch natural size, fertile portion enlarged.

Xylaria theissenii Lloyd in Mycological Notes 5, p. 677, June 1917.

Stroma long and slender, stalk elongated, 1.5 mm. thick, dark brown, smooth or finely longitudinally wrinkled, strigosely hairy below, fertile portion up to 1.5 cm. long, with slender, pointed, sterile tip; flesh white, solid; perithecia mammiform, black, erumpent through a thin, yellowish-brown, finely cracked surface layer; ostiolar papillae subconical; asci 13μ wide, 8-spored, with a massive apical ring; ascospores uniseriate, chestnut brown, $25-31 \times 9-10 \times 8\mu$. Rooting among dead leaves.

Brasil: Sao Leopoldo, Rio Grande do Sul, 1907, *Theissen*, *Decades fungorum brasiliensium* 235, issued as *X. thyrsus* (Berk.) Sacc. Fig. 5.

Examination of an example of the above in the Stockholm herbarium shows this rare or local species to be quite distinct from *X. luxurians* (Rehm) Lloyd but akin rather to the asiatic *X. thyrsus*, with which Theissen mistakenly identified it.

Xylaria Group 11 (*Xylariodiscus*).

Hennings' genus *Xylariodiscus* has never been adopted by other authors and was ridiculed by Theissen as based solely on the shape of the stroma. Nevertheless there is a small group of species, at present assigned to various genera of Xylariaceae, which have a number of characters in common with *Xylariodiscus dorstenioides* Henn. and which may be as worthy of generic rank as the long accepted genus *Poronia*. All have white-fleshed capitate stromata with thin, white or brownish, non-carbonaceous crust, usually with rather prominent perithecia and slender smooth stalks. All occur on the ground or on vegetable debris, especially grass, lying on the ground, and two at least are associated with burning of the substrate. In addition to *X. guaranitica*, already described, the two following American species are best referred to this group.

Xylaria phoenix (Kunze) comb. nov.

Sphaeria phoenix Kunze apud Fries in *Linnaea* 5, 541 (1830).

Hypoxylon phoenix (Kunze) Berk. & Curt. in J. Acad. Nat. Sci. Philadelphia N.S. 2, 287 (1853).

Xylaria kurziana Currey in Trans. Linn. Soc. London, Ser. 2, 1, 129 (1876).

Kretzschmaria truncata Pat. in Bul. Soc. mycol. France 4, 109 (1888).

Stromata with rooting bases and slender, often branched, smooth, brown stalks, terminated by convex to hemispherical fertile heads 4-5 mm. across. Crust smooth, yellowish, becoming brown; flesh solid, white; perithecia immersed but with their upper surface often protruding somewhat to give a mammiform surface ornamented by large, black, ostiolar papillae. Asci 8-spored, with small apical ring blued by Melzer's reagent; ascospores uniseriate, fusiform, brown, $14-18 \times 5-9\mu$, biguttulate, with a pale strip along one edge. Fig. 6.

Collections seen:

Surinam: In caespitibus graminum semicombustis (*S. phoenix* from Kunze in Herb. Paris.)

Venezuela : A terre dans un trou formé par un arbre déraciné et brûlé, Puerto Zamuro, 14.6.1887, Gaillard 62, typus of *K. truncata* in Herb. Farlow.

Uganda : Victoria Nyanza region, T. D. Maitland.

India : On a brickland spot on which formerly fire was burning, Calcutta Botanic Garden, in rainy season, J. Kurz 2650 (Typus of *X. kurziana*) ; Auf Brandstaetten an angebrandten Holz staemmen im Bot. Garten, Calcutta, June, 1867, J. Kurz 1783.

Burma : Pegu, Herb. Currey.

Philippine Is. : On dead grass, Los Banos, 15.7.1913, Copeland 1265.

The last named may very probably be from the same locality as the type collection of *Poronia hypoxylodes* Rehm, 1913, another probable synonym which I have not seen.



FIG. 6. *Xylaria phoenix* from the type collection of *K. truncata*, habit sketch natural size, half of a fertile disc and vertical section enlarged.

Ascospores of the Surinam and Uganda collections and those in some but not all mounts of Kurze's material show faint longitudinal striations such as I have not seen in those from Puerto Zamuro. Maitland's and Gaillard's collections, however, appear identical when examined side by side under a dissecting microscope and it seems best at present to assume they belong to the same species. The faint striation may perhaps be apparent only at one stage in the maturation of the ascospores but it should be looked for when further collections of this interesting fungus come to hand from the American tropics. The striate ascospores and association with burnt plant tissue are reminiscent of *Neurospora*.

***Xylaria ustorum* (Pat.) Dennis comb. nov.**

Poronia ustorum Pat. in Bull. Soc. Mycol. France **3**, 175 (1888).

Stroma erect, usually unbranched, with smooth, slender, white stalk expanded abruptly into a slightly convex fertile head, 4–5 mm. across, with soft white crust and even or slightly mammiform surface ornamented with convex, black, ostiolar papillae ; perithecia immersed,

closely spaced under the upper surface of the stroma ; flesh white, solid. Asci 8-spored, with apical ring blued by Melzer's reagent ; ascospores uniseriate, elliptical to inequilateral, brown, $8-10 \times 4-5\mu$. Fig. 7.

Collections seen :

Venezuela : Sur l'herbe brulée, Savane au pied du Cerro Uniana, rive droite du Rio Meseta, 4.6.1887, leg. *Gaillard*, in Herb. Farlow.

Brasil : On dead grass, Santarem, Spruce Lichenes Amazonici et Andini 813.

Judging from the description *Poronia polyporoides* P. Henn. 1901, is a synonym of *X. ustorum*, though its ascospores are described as slightly larger, $9-12 \times 5-6\mu$. A Nigerian collection at Kew has such slightly larger ascospores and it remains to be seen if these are characteristic of material from the old world tropics. I have not seen the collection on grass from New Caledonia, which is apparently not in the Patouillard herbarium at Cambridge, Massachusetts. The soft texture of *X. ustorum* and its white surface might lead to its being sought among the Hypocreaceae.

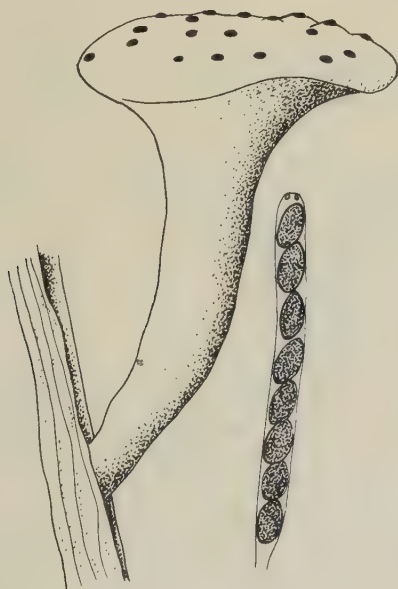


FIG. 7. *Xylaria ustorum*,
stroma attached to grass
 $\times 10$, ascus $\times 660$.

***Podosordaria* Ellis & Holway** in Bot. Gaz. **24**, 37, July 1897.

In Kew Bulletin 1956, pp. 442-3 I commented that group 12 of *Xylaria*, comprising the coprophilous species with subglobose heads of light-coloured, somewhat mammiform perithecia, might be worthy of generic rank. The generic name *Podosordaria* Ell. & Holw. is available for these fungi, as it was founded as *P. mexicana* Ell. & Holw. which is scarcely separable from *Xylaria chardoniana* (Toro) Miller. Segregation of this group of species makes it easier to circumscribe both *Xylaria* and *Poronia*, to which they are at present referred, and I therefore propose to revive *Podosordaria* as a genus with the following species :—

Podosordaria pedunculata (*S. F. Gray*) *Dennis* comb. nov.

Hypoxylon pedunculatum [Dicks.] *S. F. Gray* Nat. Arr. Brit. Plants **1**, 512 (1821).

Sphaeria pedunculata Dicks. ex Berkeley in Ann. Mag. Nat. Hist. **1**, 205 (1838).

Xylaria pedunculata (*S. F. Gray*) Fries Summa Veg. Scand. Sect. Post. 382 (1849).

There is some error in *S. F. Gray*'s description but he cites as basonym *Sphaeria pedunculata* Sowerby Fungi 437 (1810) and Sowerby duly ascribed the name to Dickson.

Xylaria vaporaria Berk. and *Poronia macrospora* Peck are probable synonyms.

Podosordaria mexicana *Ell. & Holw.* in Bot. Gaz. **24**, 37, July 1897.

Mexico : Cuernavaca, on cow dung, September.

This, the type species of *Podosordaria*, appears indistinguishable from *Xylaria chardoniana* (Toro) Miller. I find ripe ascospores 30–33 × 16–18 μ , without their thin hyaline gelatinous coats.

Podosordaria tulasnei (*Nitzschke*) *Dennis* comb. nov.

Xylaria tulasnei Nitzsche Pyrenomycetes Germanici 8 (1867).

Podosordaria leporina (*Ell. & Ev.*) *Dennis* comb. nov.

Poronia leporina Ell. & Ev. in Proc. Acad. Nat. Sci. Philadelphia 229 (1890).

Poronia minuta Petch in Ann. Roy. Bot. Gard. Peradeniya **6**, 225 (1917).

Poronia *Willdenow ex Fries* Summa Veg. Scand. Sect. Post. 382 (1849).

The type species of *Poronia* is *P. punctata* (Fr.) Fr. in which the distinctive features are the coprophilous habit and the shape of the stroma, stipitate, saucer-shaped above with a flat whitish upper surface bearing the ostioles. When other, obviously related species are considered however, it becomes extremely difficult to separate *Poronia* from *Xylaria*. As originally accepted by Fries the genus was obviously based on gross morphological characters alone, for it included two species, one coprophilous, the other lignicolous. There are fungi usually referred to *Xylaria* which agree with *Poronia* in spore characters and in growing on dung but have the perithecia in a subglobose head rather than a flattened disc, here transferred to *Podosordaria*, and others referred to *Poronia* which have a white flattened disc but grow on wood or plant debris. If the genus is to be retained the most natural solution would probably be to stress the coprophilous habit. The white, flat-topped, terrestrial fungi with rooting bases probably originating from buried wood, at present called *Poronia ehrenbergii* P. Henn., *P. doumetii* Pat. and *P. arenaria* Syd. & Butl., would then be treated as a group of semidesert *Xylarias* akin to *X. agariciformis* Cooke and Masee. These are all species of the eastern hemisphere and accordingly are not dealt with further here.

In the narrowest interpretation, of fungi which agree with *P. punctata* both in substrate and in stromatic characters, *Poronia* includes only one tropical American species, viz. :

Poronia oedipus (Mont.) Mont. in Ann. Sci. Nat. Bot. Ser. 4, **3**, 114 (1855).

Hypoxyton oedipus Mont. in Ann. Sci. Nat. Bot. Ser. 2, **13**, 349 (1840).

Poronia macrorhiza Speg. in An. Soc. Cient. Argentina **10**, 1880.

? *Poronia hemisphaerica* Starb. in Bihang till K. Svensk. Akad. Handl. Bd. 27, Afd. 3, No. 9, p. 12, 1901.

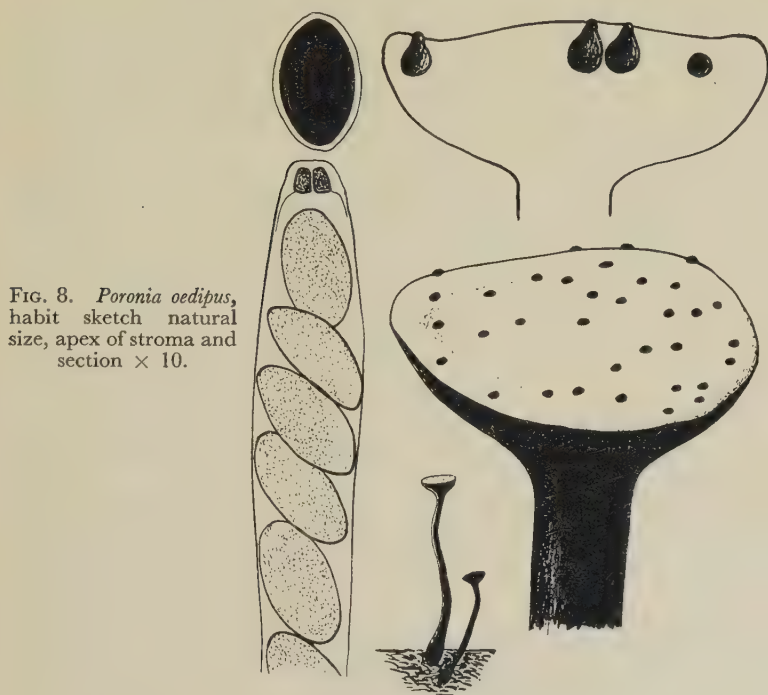


FIG. 8. *Poronia oedipus*, habit sketch natural size, apex of stroma and section $\times 10$.

Stroma simple or sparingly branched, elongated, with a distinctly bulbous foot and long, slender, smooth, dark brown stalk terminated by a saucer-shaped expansion up to 6 mm. across, its upper surface a flat, whitish to gray-brown, somewhat pruinose disc, studded with the black papillate ostioles of numerous embedded perithecia; flesh white and solid throughout. Asci large, short-stalked, 8-spored, with massive apical ring stained deep blue by Melzer's reagent; ascospores uniseriate or occasionally biseriata, elliptical or pointed at each end, very dark brown and opaque, $24-30 \times 13-17\mu$, with a longitudinal germ slit and a thin, hyaline, gelatinous coat. Fig. 8.

On dung, especially of horse and cow.

Tropical American collections seen :

Cuba : on dry cow dung, Wright 893 ; 505 ; Fungi Cubenses Wright-iani 803.

Bahamas : Nassau, New Providence, 21.7.1929.

French Guiana : Cayenne, *Leprieur* 165, ex herb. Montagne.

Surinam : Paramaribo, *Kegel* 749, in Herb. Berkeley as *Sphaeria pileiformis* Berk. (sterile).

Trinidad : on dung, leg. *Hart*, Sept. 1901 ; St. Clair, 1908, leg. *F. Evans*.

Argentina : " In fimo equino vetusto in ollis plantarum en el patio del Senor Coni ", Buenos Aires, May 1880, type collection of *P. macrorrhiza* (immature) ; same locality, Nov. 1880, with mature ascospores, Herb. Spegazzini.

There are also at Kew collections of *P. oedipus* from Alabama, Texas, Florida and Bermuda and there are trustworthy published records of its occurrence in Puerto Rico and in the states of Aragua and Trujillo, Venezuela. *P. hemisphaerica* was described from horse dung in Matto Grosso, Brasil, unfortunately from immature material without ascospores.

Poronia incrassata Jungh. 1840, on horse dung in Java, is usually cited as a synonym of *P. oedipus* ; so probably is *P. pileiformis* (Berk.) Fr., the type collection of which, from the Philippine Is., is sterile and its substrate unknown. Currey claimed ascospores 7.5μ long for the latter species but cited no collection in which he had found them and all the material under this name in his own herbarium is also sterile. It seems likely that some mistake had arisen but some of the tropical asiatic material called *P. pileiformis* in herbaria is very much larger than any specimens of *P. oedipus* from the western tropics. Presumably it was such massive stromata that Saccardo called *P. gigantea*, again without ascospores, from elephant dung in India.

Poronia caelata Pat. 1906, from Tahiti, was based on a shrivelled carpophore of some species of *Gymnophilus*, with rough ferruginous basidiospores $9-10 \times 5-6\mu$.

Kretzschmaria Fr. Summa Veg. Scand. Sect. Post., 409 (1849).

Rhopalopsis Cooke in Grevillea **11**, 93 (1883).

Kretzschmaria is a small genus of xylarioid fungi with short branched stromata terminated by clavate swellings containing completely immersed perithecia. The type species, designated by Fries, is *Sphaeria clavus* Fr., the holotype of which in Fries' herbarium at Uppsala is reduced to a single, much broken, immature stroma. Enough remains, however, to indicate that the traditional interpretation of the species is probably correct.

The typical Kretzschmarias form a small group of four closely allied species, or possibly one very variable pantropical species. They all have similar, large, elliptic-fusiform ascospores within the range $26-40 \times 7-12\mu$, uniseriate in narrow cylindrical asci with well developed amyloid apical apparatus and may be differentiated as follows, on external morphological characters (Fig. 9) :—

I. Stromatal clavae not umbonate, ostiolar papillae minute, stalks cylindrical :

- A. Clavae rounded above, borne in small clusters . . . *K. clavus*
 B. Clavae flat-topped, crowded in compact crusts . . . *K. coenopus*
- II. Clavae usually with some indication of an umbo, ostiolar papillae strongly papillate, stalks often strap-like and much branched :—
 A. Umbo feebly developed or absent, more than 1 mature perithecium in each clava *K. cetrarioides*
 B. Umbo usually strongly developed, only one mature perithecium per clava *K. micropus*

In the above species the flesh of the stroma is white at first, within a thin black carbonaceous crust, though it darkens and often disintegrates at maturity. Theissen (1909) retained in *Kretzschmaria*, *K. stilbophora* Rehm, in which the stromata are black-fleshed and have only very short unbranched stems and the modern tendency is to use the genus as a convenient receptacle for any small xylarioid fungi with stalked, flat-topped, gregarious stromata. Those with black flesh seem to be akin rather to *Hypoxylon* and *Rosellinia* and many of those with white flesh appear to be intimately allied to individual species of *Xylaria*, of which they may be no more than varieties or forms. Some of those most commonly met with are, however, briefly described below under the names that have been assigned to them in *Kretzschmaria*, for the convenience of collectors who are likely to seek descriptions of them under this heading.

***Kretzschmaria clavus* (Fr.) Sacc. Syll. fung. 2, p. xxix (1883).**

Sphaeria clavus Fr. in Linnaea 5, 543 (1830).

Hypoxylon clavus (Fr.) Mont. in Ann. Sci. Nat. Bot. Ser. 2, 13, 355 (1840).

Rhopalopsis clavus (Fr.) Cooke in Grevillea 11, 94 (1883).

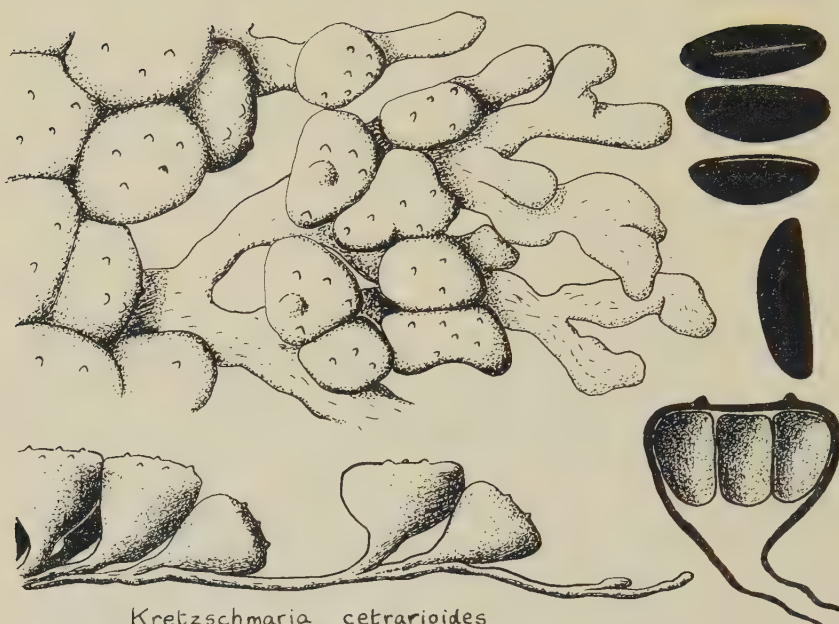
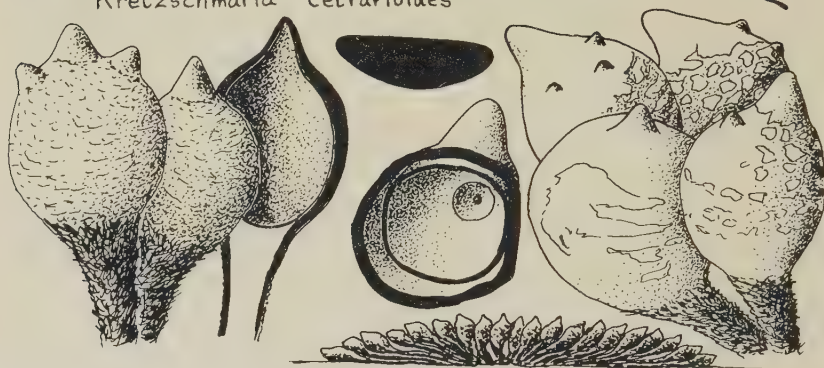
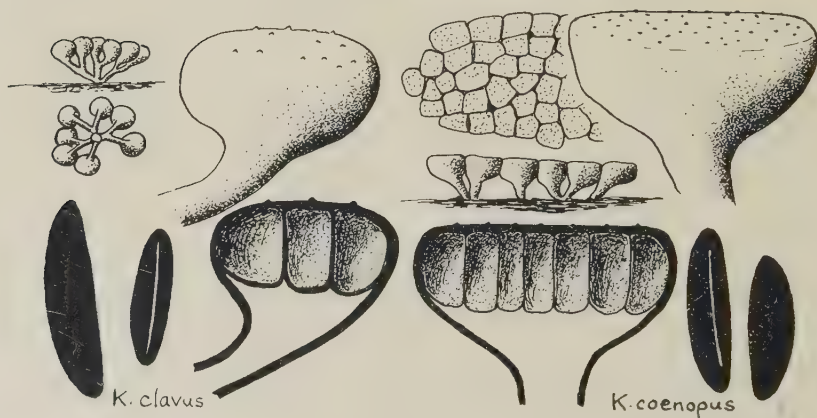
Kretzschmaria pusilla Ell. & Ev. in Bull. Lab. Nat. Hist. Iowa State Univ. 2, 410 (1893).

Kretzschmaria australiensis P. Henn. in Hedwigia 42, Beiblatt p. (83), 1903.

Stromata with short, subcylindric, simple or forked, smooth, black stalks, radiating from a common centre and terminated by subglobose to obconical clavae up to 5 mm. across ; crust smooth, black, brittle but not cracking regularly between the ostioles ; ostiolar papillae numerous, minute, black, only slightly protruding, confined to the upper surface of the clavae ; flesh at first white, rather soft and spongy, becoming black throughout with age and often disintegrating ; perithecia relatively large, crowded in a horizontal layer occupying the whole upper half of each clava. Fig. 9, lower left.

Tropical American collections seen include :

Brasil : unlocalised collection leg. Beyrich, in Herb. Fries., Uppsala (Holotype) ; in corticibus emortuis, Panuré, Amazonas, Feb. 1853, Spruce 147 ; Villa Bella, 13.4.1874, Trail 175 ; on dead *Roystonea* trunk, Jardim Botânico do Rio de Janeiro, O. & K. Fidalgo, F82, 11.7. 1955, probably also a fragment marked " Rio de Janeiro, Gaudichaud 1835 ".

*Kretzschmaria cetrarioides**Kretzschmaria micropus**K. clavus**K. coenopus*

British Guiana : on standing mossy trunk, Moraballi Creek, Bartica, Essequibo R., Oct. 1929, *E. B. Martyn* 608 ; on bark of *Mora gonggrijpii*, Moraballi Creek, Oct. 1929, *E. B. Martyn* 642.

St. Vincent : apparently from *Rev. Guilding*, in Herb. Hooker.

Cuba : on dead bark in woods, March, *Wright* 493.

Nicaragua : fallen trunks, Castillo Viejo, Rio San Juan, *C. L. Smith*, Feb.-March 1893, as *K. pusilla*.

Kretzschmaria pusilla was described as having ascospores $20-22 \times 6\mu$ but those of the type collection at New York Botanical Garden, cited above, measure $28-32 \times 7-9\mu$ and the fungus appears to me to be simply a state of *K. clavus* with rather small clavae.

***Kretzschmaria coenopus* (Fr.) Sacc. Syll. fung. 2, p. xxix, 1883.**

Sphaeria coenopus Fr. in *Linnaea* 5, 542 (1830).

Hypoxylon coenopus (Fr.) Mont. in *Ann. Sci. Nat. Bot. Ser. 2*, 13, 356 (1840).

Xylaria coenopus (Fr.) Berk. & Curt. in *J. Acad. Nat. Sci. Philadelphia*, N.S.2, 285 (1853).

Rhopalopsis coenopus (Fr.) Cooke in *Grevillea* 11, 93 (1883).

Kretzschmaria divergens Starb. in *Bihang. K. Svensk. Akad. Handl.* 27, 3, 6 (1901).

The name *Kretzschmaria coenopus* has been in common use for collections in which the clavae are somewhat larger and more flat-topped than in typical *K. clavus*, packed tightly together in dense swarms on bark, with shorter, often simple stalks, more numerous perithecia and even less prominent ostiolar papillae. The holotype of *Sphaeria coenopus* can no longer be found at Uppsala but there remains in the Fries herbarium part of a later collection supplied to him by Montagne and evidently accepted as representing his species. In their typical developments *K. clavus* and *K. coenopus* look distinct but the differences are none of them clear cut and apparently intermediate states are not uncommon. Probably, therefore, the two names apply merely to extreme forms of a single variable species. Nevertheless it is possible to place most collections with fair confidence in one or the other group and those of predominantly *K. coenopus* aspect are listed separately below as a matter of convenience. Fig. 9 lower right.

Brasil : Matto Grosso, Serra da Chapada, Buriti, 4.6.1894, *G. A. Malme* 624 (Typus of *K. divergens* in Herb. Stockholm).

French Guiana : fragments ex Herb. Montagne in Herb. Kew. and Uppsala.

FIG. 9. The tropical American species of *Kretzschmaria*. Above, *K. cetrarioides*, sketch of marginal portion of a stroma from above and from the side $\times 4$, from Rick 172, authentic for *K. lichenoides*, section $\times 6$, from type collection of *K. cetrarioides*. Centre left 3 clavae from *Wright* 332, remainder from type collection of *K. aggregata*, one broken open at the base to show the single matured perithecium with ostiole at one side of the sterile tip, $\times 6$, habit sketch natural size. Below, on left, *K. clavus* from *Martyn* 642, on right *K. coenopus* from *Baker* 12, $\times 6$ with habit sketches natural size.

Colombia ; on dead wood, Cano Unguya, Rio Apaporis, Vaupes, R. E. D. Baker 4, 4.9.1952 ; on dead wood, Jinogoje, Rio Apaporis, R. E. D. Baker 12, 6.9.1952.

Cuba : Wright 584 and Fungi Cubenses Wrightiani 810, 811.

Kretzschmaria cetrarioides (Welw. & Curr.) Sacc. Syll fung. **2**, p. xxix, 1883.

Hypoxylon cetrarioides Welw. & Curr. in Trans. Linn. Soc. **26**, 282 (1868).

Rhopalopsis cetrarioides (Welw. & Curr.) Cooke in Grevillea **11**, p. 94 (1883).

Xylaria puiggarii Speg. in An. Soc. Cient. Arg. 12, 1881 (p. 52 of reprint).

Kretzschmaria pechuelii P. Henn. in Engler's Bot. Jahrbucher **14**, 365 (1891).

Kretzschmaria novo-guineensis P. Henn. in Beiblatt 33 zu Bot. Jahrb. 15, 7 (1892).

Kretzschmaria lichenoides Rehm in Hedwigia **44**, 6 (1904).

Kretzschmaria paradoxa Pat. in Bull. Soc. Mycol. France **8**, 51 (1892).

Kretzschmaria botritis Lloyd in Mycological Notes 6, 995, Sept. 1920.

Kretzschmaria singaporensis Sacc. in Bull. Orto Bot. Napoli **6**, 48 (1921).

In this species the clavae, which are at first gray, have distinctly conical ostiolar papillae, usually fewer than in *K. clavus*, and occur in dense swarms borne on much branched, flattened, strap-like stalks radiating from a common centre. The under surface of such a much branched stroma, with its tangled mass of flat, black, thalloid stalks, is suggestive of some species of the lichen genus *Cetraria*, hence the specific epithets proposed by Welwitsch and Currey and by Rehm. The name *Kretzschmaria lichenoides* (Berk.) Sacc., applied to the next species, is apparently a nomen nudum. The type collection of *K. cetrarioides* was from Angola : both in it and in authentic material of *K. lichenoides* Rehm a few clavae show a low sterile umbo in the middle of the upper surface. This feature is important as showing affinity with the next species rather than with *K. clavus*. Welwitsch and Currey commented that " this species is developed between the decayed bark and the wood. The lichenoid expansion of the stroma is probably due to the absence of light ". In Rick Fungi Austro Americani 172, however, the lichenoid stroma spreads freely over the surface of the bark and this feature, combined with the more conical ostiolar papillae and the occasional presence of an umbo encourages one to treat *K. cetrarioides* as a good species and not a growth form of *K. clavus*. It is much less clear that this species is truly distinct from *K. micropus*, with which Petch apparently united it as a result of his field experience in Ceylon. Fig. 9, top.

Tropical American collections seen :

Brasil : Sao Leopoldo, Oct. 1903, leg. Rick, in Herb. Rehm. and Herb. Bresadola, Stockholm, authentic for *K. lichenoides* Rehm ; in ligno frondoso, Sao Leopoldo, 1906, Rick, Fungi Austro-Americani 172 ; an einem Baumstamm, Jurua, Bom Fim, Amazonas, Nov. 1900, Ule

Herbarium Brasiliense 2840, as *K. coenopus*; Guia, Matto Grosso, 14.5.1894, leg. Malme 591B, in Herb. Stockholm as *K. pechuelii*; Apiahy, Sao Paulo, leg. J. Puiggari (Typus of *X. puiggarii* in Herb. Spegazzini).
Surinam : ex Herb. Schweinitz.

Kretzschmaria micropus (Fr.) Sacc. Syll. Fung. **2**, p. xxix, 1833.

Sphaeria micropus Fr. in Linnaea **5**, 542 (1830).

Hypoxylon micropus (Fr.) Berk. in J. Linn. Soc. Bot. **10**, 383 (1869).

Rhopalopsis micropus (Fr.) Cooke in Grevillea **11**, 94 (1883).

Hypoxylon aggregatum Welw. & Curr. in Trans. Linn. Soc. **26**, 282 (1868).

Rhopalopsis aggregatum (Welw. & Curr.) Cooke in Grevillea **11**, 93 (1883).

Kretzschmaria aggregata (Welw. & Curr.) Sacc. Syll. Fung. **2**, p. xxix (1883).

Kretzschmaria spinifera Ell. & Ev. in Bull. Lab. Nat. Hist. Univ. Iowa **4**, 71 (1896).

Kretzschmaria erythraeae Bacc. & Sacc. in Annali di Botanica **14**, 133 (1916).

Clavae clavate, each terminated by a prominent sterile umbo around which are a few, usually less than five, black, shining, conical, ostiolar papillae. Usually only one perithecium develops and comes to occupy the whole interior of the clava. The crust is at first covered by a thin dark gray-brown felt, which splits into scales and gives the surface a finely rugose appearance. The stalks are strap-like, more or less branched and matted together by brown hyphae. Fig. 9, centre.

No stromata remain on the small piece of bark which forms the type collection in Fries' herbarium at Uppsala and the description has therefore been drawn up from the excellent material of *H. aggregatum* in the herbarium of the British Museum. This was from Angola but it appears to me the same species as the poor Cuban material identified with *S. micropus* by Berkeley. In the latter, however, the single perithecium seems to be usually terminal, not at one side of an umbo as in Welwitsch and Currey's material. The good specimens of *K. spinifera* at New York Botanical Garden match the type collection of *H. aggregatum* quite well.

Tropical American material seen :

Cuba : Wright 332.

Mexico : C. L. Smith, 1895, typus of *K. spinifera* at New York.

Among other South American fungi which have been referred to *Kretzschmaria* but which are more probably reduced species of *Xylaria* or stunted states of already described Xylariaceae are *K. heliscus*, *K. sessilis*, *K. microspora* and *K. stilbophora*. The type collections or authentic material of these are briefly described below but much further collecting of these minute fungi will be necessary before they can be adequately studied.

Kretzschmaria heliscus (Mont.) Massee in Kew Bull. 1898, p. 118.

Hypoxylon heliscus Mont. in Ann. Sci. Nat. Bot. Ser. 2, **13**, 355 (1840).

Poronia heliscus (Mont.) Mont. in Ann. Sci. Nat. Bot. Ser. 4, **3**, p. 114 (1855).

Rhopalopsis berkeleyanum Cooke in Grevillea **12**, 2, Sept. 1883.

Kretzschmaria berkeleyana (Cooke) Berl. & Vogl. Syll. Fung. **9**, 566 (1891).

Kretzschmaria gomphoidea Penz. & Sacc. in Michelia **11**, 493 (1898).

Kretzschmaria scruposa Pat. & Har. in Journal de Botanique **17**, 14 (1903).

Kretzschmaria turbinata Petch in Ann. Roy. Bot. Gard. Peradeniya **8**, 136 (1924).

This resembles *Xylaria feejeensis* (Berk.) Fr. in everything but stature and is most probably a state of that species with small flat-topped stromata crowded together on patches of dead bark (Fig. 10). The Kretzschmarioid form has a pantropical distribution comparable to that of typical *X. feejeensis* and only the South American collections are cited here :



FIG. 10. *Kretzschmaria heliscus*, habit sketch natural size, one stroma enlarged.

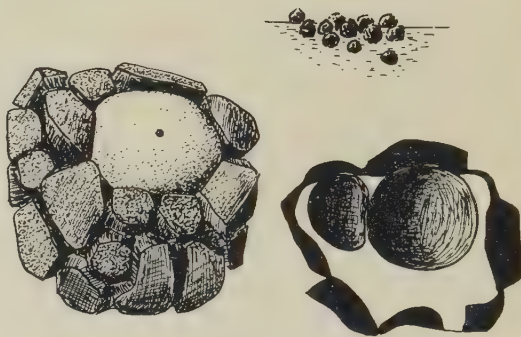


FIG. 11. *Kretzschmaria sessilis*, group of stromata natural size, one stroma and section enlarged.

French Guiana : Ad truncos emortuos in sylvis paludosis radices montis Tigre circumdantis, hieme 1838 lectum, *Leprieur* 252, type number of *H. heliscus*, portion from Montagne in Herb. Berkeley.

Brasil : Rio de Janeiro, *Glaziou* 8542, typus of *R. berkeleyanum*.

Miller (1934) recorded a collection from Carabobo, Venezuela.

The little fungus which Rick distributed as *Fungi Austro-americi* 43 under the name *K. coenopus* has ascospores $9-11 \times 4-4.5\mu$ and seems to be a still more reduced state of the above, comparable with *X. massulae* Cesati 1879.

Kretzschmaria sessilis Pat. in Bul. Soc. Mycol. France **11**, 223 (1895).

This is another minute *Xylaria* with globose to shortly cylindrical sessile or subsessile stromata 2-3 mm. across, remarkable for their unusually

thick corky black crust, which cracks into irregular scales. Each stroma contains only a few, up to about 6, perithecia, completely immersed in the solid white flesh and with scarcely perceptible ostiolar papillae. Those examined were all unripe but Patouillard found ascospores $11-13 \times 5-6\mu$ which suggests a relationship with *X. longipes* rather than *X. feejeensis*. Fig. 11.

Ecuador : Sur un tronc pourri, San Jorge, leg. *Lagerheim*, July 1892, Typus in Herb. Farlow.

Kretzschmaria microspora P. Henn. in *Hedwigia* **43**, 261 (1904).

Here minute subglobose stromata 1-1.5 mm. across, containing from one to three perithecia, are clustered on a dense mat of brown hyphae. The black crust appears to remain smooth and uncracked and the ostiolar papillae are convex and fairly prominent; the scanty white flesh is fibrous and disintegrates at maturity. In the example seen the ascospores measured $9-12 \times 3.5-4.5\mu$, rather larger than the size quoted by Hennings, $7-10 \times 3-3.5\mu$. Fig. 12.

Brasil : Amazonas, Rio Jurua, Jurua Miry, Auf totem Holz, August 1901, *Ule* 2842, in Herb. Sydow, Stockholm.



FIG. 12. *Kretzschmaria microspora*, group of stromata natural size, individual stromata and section enlarged.



FIG. 13. *Kretzschmaria stilbophora*, stromata and section $\times 10$.

Kretzschmaria stilbophora Rehm in *Ann Mycol.* **5**, 526 (1907) has even more reduced stromata, with black flesh enclosing a single perithecium containing ascospores $12-15 \times 5-6\mu$ and appears akin rather to *Hypoxylen* and *Rosellinia* than to *Xylaria*. Fig. 13.

Camillea Fries *Summa Veg. Scand. Sect. Post.* 382 (1849).

The generic name *Camillea*, in honour of Camille Montagne, was proposed by Fries for the subgenus of *Hypoxylen* which Montagne in 1840 had called *Bacillaria*. Fries cited no species by name in his diagnosis



FIG. 14. The tropical American species of *Camillea* and *Phylacia*. Stromata natural size with details enlarged and ascospores $\times 660$; all original except the section of *C. bilabiata* which is copied from Spegazzini's pencil sketch on the type packet, for reasons indicated in the text.

but referred to Montagne's figures of *Hypoxylon lepriurii* and *H. cyclops* which are, therefore, the foundation species of *Camillea*. Clements and Shear chose *H. lepriurii* as the lectotype, a selection which is obviously acceptable, especially as it is also the best known species in the genus. Venezuelan material of *C. lepriurii* was thoroughly studied by Patouillard (1888) and was found to be intimately associated with thin flattened stromata containing similar ascospores, which he identified with *Hypoxylon melanaspis* Mont. and claimed as an expanded state of the *Camillea*.

In their typical developments the species of *Camillea* are characterised by cylindrical, flat-topped, black-fleshed stromata with thin carbonaceous crusts, having embedded in their upper part numerous flask-shaped perithecia, which open by ostioles in the apical disc of the stroma. They fall naturally into two groups, one in which the perithecia discharge by individual ostioles, the other in which they discharge collectively through canals beneath the stromatic disc (Fig. 14) :—

I. Perithecia discharging individually :

A. Stromata columnar :

1. Perithecia numerous, in a ring, ascospores $25-32 \times 6-7\mu$ *C. lepriurii*
2. Perithecia few, ascospores $5-7 \times 3-4\mu$. . . *C. bacillum*

B. Stromata discoid, perithecia numerous, packed beneath the entire disc *C. labellum*

II. Perithecia discharging through canals, stromata usually as broad as tall :

A. Canals opening by a ring of ostioles on a flat disc . *C. cyclops*

- B. Canals opening into a single groove along an umbo *C. mucronata*
- C. Disc without an umbo but its margin raised into 2 opposite hoods *C. bilabiata*

Numerous other species with somewhat turbinate, clavate or subglobose carbonaceous stromata devoid of ostioles and breaking open at maturity to liberate a mass of loose dry spores have been referred to *Camillea* by Lloyd and others. Ultimately Lloyd (1924), with cynical candour, defined *Camillea* as "any large Pyrenomycete that Montagne did not feel like referring to *Hypoxylon* or *Xylaria*." This wide concept of the genus is clearly untenable as it brings together fungi with very different asci, different-shaped spores and different methods of spore dispersal. The species with diffluent asci in perithecia devoid of ostioles are here treated in the genus *Phylacia* and when they have been excluded the South American species of *Camillea* form a compact, easily recognisable and probably quite "natural" group.

Camillea lepriurii (Mont.) Mont. in Ann. Sci. Nat. Bot. Ser. 4, **3**, 122 (1855).

Hypoxylon (*Bacillaria*) *lepriurii* Mont. in Ann. Sci. Nat. Bot. Ser. 2, **13**, 352 (1840).

Stroma erumpent from bark, cylindrical, carrying with it a circular disc of bark, at first enclosed within a thin membrane which is split by vertical extension of the stroma and remains only as a basal ring and an operculum, the upper side of which adheres to the under surface of the disc of bark while the lower side fits closely against the apical disc of the stroma. Mature stroma up to 3 cm. \times 3-8 mm., smooth, black, having at the apex a flat disc, exposed by shedding the operculum, surrounded by a low rim which is slightly undercut on its inner side, where there is a ring of small, shallow, confluent depressions into which the papillate ostioles emerge. Perithecia flask-shaped, with membranous walls, completely embedded in the black flesh of the stroma but easily detached from it when the stroma is broken open. Asci very long-stalked, narrowly cylindrical, about $250-300 \times 8\mu$, 8-spored, with well-developed apical ring stained deep blue by Melzer's reagent; ascospores uniseriate, olivaceous, fusiform-clavate, very pointed below, $25-35 \times 6-8\mu$; paraphyses tapering, hyaline, rather broad below, with numerous oil drops.

For a description of the expanded hypoxylid state see Patouillard (1888).

Collections seen :—

French Guiana : *Leprieur* 243, authentic material from Montagne in Herb. Berkeley and Herb. Currey.

British Guiana : on dead branches, Moraballi Creek, near Bartica, Essequibo River, *P. W. Richards* 324, 4.9.1929 ; 488, 28.9.1929.

Brasil : Para, Caripi, *R. Spruce* 1849.

The collection described and figured by Patouillard came from San Fernando de Atabapo, on the upper Orinoco, Venezuela.

Camillea bacillum (*Mont.*) *Mont.* in Ann. Sci. Nat. Bot. Ser. 4, **3**, 113 (1855).

Thamnomycetes bacillum *Mont.* in Ann. Sci. Nat. Bot. Ser. 2, **8**, p. 858 (1837).

Hypoxylon bacillum (*Mont.*) *Mont.* apud Ramon de la Sagra, Flora Cubana **1**, 210 (1853).

Stromata gregarious, erumpent from small blackened patches of bark, rod-shaped, up to 10 mm. high and 1 mm. thick, with smooth black crust, surrounded at the base by a short black collar, apex rounded, dimpled by the ostioles; flesh black, solid, perithecia 3 to 5 per stroma, flask-shaped, elongated and parallel but irregularly spaced, completely immersed in the upper part of the stroma. Asci not seen, ascospores slightly reniform, almost black, $5.5-7 \times 3.5-4\mu$.

Collections seen :

"Antilles" : Herb. Montagne, typus, apparently received through Mougeot from Ramon de la Sagra.

French Guiana : *Leprieur* 1180, Herb. Paris.

Recorded by Miller from Yaracuy, Venezuela and by Seaver from Trinidad.

Camillea labellum Mont. in Ann. Sci. Nat. Bot. Ser. 4, **3**, 113 (1855).

Diatrype artocreas Cooke & Massee in Grevillea **21**, 4, September 1892.

Nummularioidea artocreas (Cooke & Massee) Lloyd in Mycological Notes 7, 1281 (1924).

Stromata erumpent, discoid, up to 1.5 cm. across and 1 cm. thick, black, with almost vertical sides ornamented with closely spaced low warts and crowned by a coarsely warted rim around the flat to slightly convex apical disc, the latter black, smooth, shining, closely dimpled all over around the minute scarcely papillate ostioles. Crust thick, carbonaceous, brittle; flesh solid, black; perithecia flask-shaped, elongated, parallel and closely packed beneath the whole area of the disc. Asci cylindrical, very long and delicate, with small apical ring blued by Melzer's reagent, 8-spored; ascospores uniseriate, fusiform, inaequilateral, almost hyaline to yellowish, $12-14 \times 3-4\mu$.

Collections seen :

French Guiana : truncis mortuis ad oram sylvarum circa Cayenne, July 1841, *Leprieur* 1179 (cited in error by Montagne as 1178), typus of *C. labellum*, Herb. Paris.

St. Vincent : on wood, typus of *D. artocreas*.

Montagne, normally exceedingly accurate in his observations, described the spores of *C. labellum* as "fuscae, subfusiformes, 0.03 mm. longae, inaequilatae, nempe hinc rectae, illinc convexae", but in none of the specimens in his herbarium can I find any trace of ascospores. Lloyd (1924) was equally unsuccessful. As the type collections of *C. labellum* and *D. artocreas* appear in other respects identical it seems possible some error crept into Montagne's description of the former. Hence it has been thought best here to cite the names as synonyms but the reader should be on the watch for collections of a fungus like the above but with ascospores 30μ long, as called for by Montagne.

Camillea cyclops (Mont.) Berk. & Curt. in J. Acad. Nat. Sci. Philadelphia, N.S. 2, 285 (1853).

Hypoxylon (Bacillaria) cyclops Mont. in Ann. Sci. Nat. Bot. Ser. 2, **13**, 353 (1840).

Stromata erumpent, cylindrical but usually broader than high, with a flat apical disc surrounded by a broad low rim, carbonaceous, black-fleshed, containing numerous flask-shaped perithecia occupying the whole central portion of the stroma. The perithecia discharge into narrow canals which emerge in a ring of about 7 or 8 low papillate ostioles on the apical disc. Asci narrowly cylindrical, stalked, about $120 \times 7\mu$, with apical ring stained deep blue by Melzer's reagent, 8-spored; ascospores elliptic-clavate, more or less narrowed below, pale yellowish brown, $8-10 \times 4-5\mu$.

Collections seen :

French Guiana : Cayenne, *Leprieur* 221, authentic material from Montagne in Herb. Berkeley and Herb. Currey.

British Guiana : *Altson* 1926, No. 461.

If *Hypoxylon melanaspis* be an expanded state of *C. lepieurii* then possibly *H. macromphalum* Mont. may be an expanded state of *C. cyclops* but I can find no spores in the authentic material of *H. macromphalum*, at Kew, by which to check this hypothesis.

Camillea bilabiata Speg. in Bol. Acad. Nac. Cienc. Cordoba 11, 1889.

The type packet of *C. labiata* in the Spegazzini herbarium at La Plata contains only a minute flake from a stroma, sufficient to show that the perithecia are cylindrical and that the black flesh contains canals into which they may have discharged ; no spores remain. On the packet is a pencil sketch by Spegazzini showing that the disc was concave and that the rim rose into a lip or hood like that of *C. mucronata*. Apparently in *C. bilabiata* there were two of these hoods, opposite one another, and no umbo on the disc. The type collection was on bark, at Apiahy, Brasil.

Camillea mucronata Mont. in Ann. Sci. Nat. Bot. Ser. 4, 3, 112 (1855).

Stromata like those of *C. cyclops* but with the apical disc occupied by a prominent, acutely conical, umbo with a deep groove down one side into which the canals from the perithecia discharge. The rim of the disc is raised and curved forward as a hood on the side facing the groove down the umbo. Asci and spores unknown.

Collections seen :

French Guiana : Authentic specimen from Montagne in Herb. Berkeley.

British Guiana : Large colony over the whole of a dead log in Greenheart bush, left bank of Cuyuni River, Essequibo, 1.3.1931, Martyn 255.

Both in Montagne's material and in Martyn 255 a few stromata bear a number of small gall-like warts around the rim. The presence of these and the total absence of spores may indicate that the stromata have been parasitised, perhaps by some insect. On the other hand the perithecia appear undistorted and the structure appears very uniform throughout the whole of the material seen. It would be premature to dismiss *C. mucronata* and *C. bilabiata* as abnormal or parasitised states of *C. cyclops*.

Phylacia Léveillé in Ann. Sci. Nat. Bot. Ser. 3, 3, 61 (1845).

Leveillea Fries Summa Veg. Scand. Sect. Post. 409 (1849).

Henningsinia Moller in Schimper's Bot. Mitt. aus den Tropen 9, 309 (1901).

Phylacia was founded by Léveillé on a single collection of what he took to be a conidial fungus, from Colombia. The brief diagnosis ran : "Perithecia verticali elongati parallela obiecta, in stromate carbonaceo fragile insculpta. Sporae acrogenae filamentis affixae in pulverum secedentes, ostiolis nullis. Fungi sphaeroidei, epixyli." The type species is *P. globosa* and the essential features of the genus are the carbonaceous stroma, the single layer of embedded, closely packed, elongated perithecia, without ostioles and the powdery spore mass. How the spores are produced in the type species is still not certain. I have seen

part of the type collection and also good recent material kindly sent by Dr. Lindquist and can find no trace of asci in either. The spore mass is permeated by much branched, septate, thinwalled, hyaline hyphae but I can see no attachment between hyphae and spores, nor do the latter bear any scars of attachment. The whole mass is rather like the gleba of a *Lycoperdon*, but somewhat more compact, and is apparently eventually exposed by the breaking away of the upper part of the stroma.

Leveillea was proposed to replace *Phylacia* Lév. because Fries thought the latter to be a later homonym of *Phylacium* Benn. 1838 (Leguminosae) but under the Current Code of botanical nomenclature that is not so and *Leveillea* is accordingly treated as a synonym of *Phylacia*. Unfortunately Fries chose to base the name not on *P. globosa* but on a species of his own, *Sphaeria caelata* Fries, the type of which can no longer be found at Uppsala, so the synonymy is not obligatory.

Henningsinia was based on a fungus which is generally agreed to be the same as *Hypoxylon turbinatum* Berk. In this Berkeley and Möller both found asci, which the latter described as "Schläuche länglich elliptisch $35 \times 12\mu$ mit acht unregelmässig gelagerten ovalen dunkelbraunen . . . Sporen $12 \times 5\mu$." Berkeley was so impressed by the resemblance between his *H. turbinatum* and *Phylacia* that he commented "I am inclined to think that either *Phylacia* when perfect has asci which in some cases are easily absorbed or it is merely a styloporous state of *Hypoxylon*." Patouillard (1903) took the latter view. Commenting on *Hypoxylon bomba* Mont. he wrote: "L'aspect des spores de *H. Bomba* est le même que celui des spores de *P. globosa*, c'est-à-dire qu'elles sont cylindracées, droites, arrondies aux deux extrémités et de couleur brune pâle; . . . Nous ne connaissons pas leur mode d'insertion, mais il est vraisemblable qu'ici encore ce sont des stylospores. Les *Hypoxylon Sagraeanum*, *H. turbinatum*, présentent parfois la forme ascophore parfaite: leurs thèques sont arrondies ou ovoïdes et plus ou moins longuement stipitées. Or dans quelques spécimens de l'*H. Bomba*, nous avons vu que toutes les spores étaient groupées régulièrement par huit, en petites masses globuleuses de 15μ de diamètre, entourées de rares débris de parois. Ces groupes de huit spores rappellent exactement ceux des asques de *H. Sagraeanum*, et *H. turbinatum*. *H. Bomba* est donc bien congénère des espèces précédentes et comme elles, se présente sous une forme styloporée (*Phylacia*) et sous une forme ascophore." Thus Patouillard believed these fungi to exist in two externally indistinguishable states, containing spores of the same shape and colour but in the one state borne in asci, in the other as conidia. Moreover, the asci readily break down and disappear, liberating their spores within the perithecial cavity, so that in old material it will be difficult to tell whether the spores came from asci or not, a situation like that in the perithecia of *Thamnomycetes*:

If this view is correct *Phylacia* is a genus of Fungi Imperfecti and the name is not applicable to ascogenous stromata. The name for the latter will be *Henningsinia*, or *Leveillea* if one agrees with Lloyd that *Sphaeria caelata* was *Hypoxylon turbinatum*, which is known to have asci. But it is virtually impossible to be certain whether some of the old type collections originally contained asci or not and so to apportion the old specific epithets between these two assumed genera. Also, I am still not con-

vinced that there have never been asci even in *Phylacia globosa*. Until there is clear evidence that its spores are conidia I propose to adopt the name *Phylacia* in the sense proposed by Patouillard, to include all fungi with closed carbonaceous stromata containing a single layer of elongated "perithecia" packed with loose, dry, elliptical spores, whether asci have been found in them or not. (Fig. 14). The described "species" of this character all have very similar spores and have been distinguished mainly on the shape and size of the stromata, thus :

- I. Stroma more than 1 cm. diameter or else distinctly stipitate :
 - A. Stroma turbinate, flat-topped, usually more than 1 cm. across
P. turbinata
 - B. Stroma ovate, tip rounded, distinctly stalked, less than 1 cm.
P. poculiformis
- II. Stroma sessile or subsessile but narrowed below, usually in clusters :
 - A. Stroma pyriform, 3, diameter *P. sagraeana*
 - B. Stroma obovate, larger *P. globosa*
- III. Stroma sessile on a broad base :
 - A. Apex flattened or slightly concave *P. surinamensis*
 - B. Stroma hemispherical on a thin base *P. bomba*

It seems improbable that all these so-called species are indeed distinct and equally unlikely that the extreme forms *P. turbinata* and *P. bomba* can be conspecific. The distinction between *P. sagraeana* and *P. surinamensis* is difficult to apply in practice and I suspect more intensive collecting will show them to be inseparable. Lloyd and Miller both thought *P. globosa* to be a sessile state of *P. poculiformis*. If that be correct one can probably add *P. turbinata* to the synonymy, for even in the type collection there are subsessile stromata with only slightly flattened tips approaching the shape of *P. globosa*. We should then be left with two species of *Phylacia*, *P. poculiformis* and *P. sagraeana*, with a rather dubious third species in *P. bomba*. So little is known, however, about the development of these fungi and their range of variation in the field that it is undesirable to adopt such speculative reductions to synonymy at the present time. The six traditional species are therefore retained here and figured from authentic material in the Kew herbarium. If mycologists in Brasil or the Guianas will study them on the spot they may be able to form a more critical opinion regarding the number of species and their true systematic position.

Phylacia poculiformis (Mont.) Mont. in Ann. Sci. Nat. Bot. Ser. 4, **3**, 135 (1855).

Hypoxylon (*Bacillaria*) *poculiforme* Mont. in Ann. Sci. Nat. Bot. Ser. 2, **13**, 354 (1840).

Xylaria poculiformis (Mont.) Berk. & Curt. in J. Acad. Nat. Sci. Philadelphia Ser. 2, **2**, 285 (1853).

Camillea poculiformis (Mont.) Lloyd in Mycological Notes 5, Large Pyrenomycetes 9 (1917).

Stromata solitary or in small clusters, inverted pyriform, 5–8 mm. across, with short cylindrical stalks ; crust smooth or vaguely minutely dimpled, laccate, thin, black but at first with a thin reddish-brown coating ; flesh black in the stalk, solid, at first white in the broad portion of the stroma, finally black throughout. Perithecia tightly packed in the narrower apical portion of the stroma, cylindrical, with thin but persistent walls, packed with a mass of elliptic-cylindric pale olive spores, $10\text{--}15 \times 5.5\text{--}7.5\mu$. These tend to cohere in groups, sometimes of 8, usually of many more, but no trace of ascus walls has been seen.

Collections examined :

Colombia : on fallen trunk, Teresita, Rio Vaupes, 25.11.1952, Anglo-Colombian Cacao Expedition 144 ; in forest on fallen tree trunk, Santo Rosa, Rio Mirida, 25.1.1953, *ibid.* 188.

French Guiana : Cayenne, ex Herb. Montagne in Herb. Berkeley.

Surinam : Ex Herb. Schweinitz in Herb. Berkeley.

British Guiana : On a tree trunk, Pomeroon River, Sept. 1904, *A. W. Bartlett* 8696 ; Moraballi Creek, near Bartica, Essequibo River, Oct.–Nov. 1929, *E. B. Martyn* 676, 677, 759.

Venezuela : *Bassett Maguire* 27419.

It should be noted that, though Montagne originally placed this species in the subgenus *Bacillaria* he was not a party to transferring it to *Camillea*. In *Sylloge Cryptogamarum*, 1856, he retained it in *Phylacia*. Montagne a century ago had a sounder insight into the tropical American fungi than any of his better equipped successors.

***Phylacia turbinata* (Berk.) Dennis comb. nov.**

Hypoxylon turbinatum Berk. in J. Linn. Soc. Bot. **15**, 51 (1876).

Camillea turbinata (Berk.) Speg. in Bol. Acad. Nac. Cienc. Cordoba **11** (1889).

Hypoxylon turbinatum Berk. var. *guaraniticum* Speg. Fungi Guaranitici Pug. **1**, 84 (1883).

Henningsinia durissima Möller in Schimper's Bot. Mitt. aus den Tropen **9**, 309 (1901).

Stromata solitary or in small groups, up to 1.7 cm. across and 1.5 cm. tall, turbinate, flat-topped, widest a little below the fertile zone, narrowed to a stout stem-like base ; surface smooth, at first covered by a thin reddish-purple weft, at maturity with a black glossy crust, ornamented with minute, scattered, embedded granules ; flesh purplish black, solid ; perithecia cylindrical, tightly packed in a single horizontal layer, 3–4 mm. high, without ostioles. Asci elliptical, $24\text{--}35 \times 12\text{--}15\mu$, stipitate, very thinwalled, without an apical ring, 8-spored ; ascospores in an irregular cluster, elliptic-cylindric, pale olivaceous, $11\text{--}13 \times 5\text{--}6\mu$, liberated as a powdery reddish-brown mass filling the perithecia ; paraphyses abundant thinwalled, hyaline, septate, 3–4 μ wide, with numerous oil globules.

Collections seen :

Brasil : Bahia, Challenger expedition (Typus) ; Sao Leopoldo, Sta Catherina, leg. *Theissen*.

Paraguay : Sur le tronc desséché des orangers, Guarapi, 1879, *Balansa* 3417.

Spegazzini (1881) noted "Specimina mea cum genere *Phylacia* Lév. perfecte congruunt" but made no transfer because Berkeley had described asci in the type. Balansa 3417 was cited by Spegazzini as his var. *guaraniticum*; the Kew example has rather flattened stromata containing numerous cavities, apparently formed by insect larvae. It is not clear from the description how *C. turbinata* var. *obpatellata* Starb., from Rio Grande do Sul, is supposed to differ from the type. *Henningsinia durissima* also came from south Brasil, at circa 450 metres in the Serra Geral, Sta. Catharina. The distributions of *P. poculiformis* and *P. turbinata* as set out from the collections at Kew are mutually exclusive, with the former north of the equator and the latter south of it. The number of collections is, however, too small for much significance to be attached to this observation. Lloyd (1917) thought *Sphaeria caelata* Fr., type species of *Leveillea*, was *P. turbinata*.

***Phylacia globosa* Lév.** in Ann. Sci. Nat. Bot. Ser. 3, **3**, 61 (1845).

Camillea globosa (Lév.) Lloyd in Mycological Notes, 5, Large Pyrenomyces 8 (1917).

Stromata erumpent, densely gregarious, subglobose to pyriform, often deformed by mutual pressure, sessile; crust black, laccate, thin, ornamented with small shallow pits, separated by a reticulation of low narrow ridges; flesh solid, purplish-black; perithecia numerous, cylindrical, thinwalled. Spore mass reddish-brown, permeated by hyaline, septate, branched hyphae, 3–5 μ wide; spores elliptic-cylindric, 9–15 \times 4.5–8 (–10.5) μ , pale olivaceous, often biguttulate.

Collections seen :

Colombia : Tolima, part of the type collection, from Lévillé.

Argentina : Misiones, San Javier, 22.5.1951, leg. A. L. Cabrera et al. 306, in Herb. La Plata.

Husnot, Pl. des Antilles 609, from Guadeloupe, issued as *Xylaria globosa* Mont. has ascospores 25–31 \times 7–10 μ in hollow black smooth stromata and is *X. obovata* (Berk.) Fr.

***Phylacia sagraeana* (Mont.) Mont.** Syll. Gen. Spec. Crypt. 259 (1856).

Hypoxylon sagraeanum Mont. apud Ramon de la Sagra, Flora Cubana **1**, 209 (1853).

Camillea sagraeana (Mont.) Berk. & Curt. in J. Acad. Nat. Sci. Philadelphia N.S. **2**, 285 (1853).

Stromata typically densely caespitose, pyriform, up to about 8 mm. high and 3 mm. broad, at first covered with a thin, dark-brown, hyphal web, which persists as brown hyphae matting together the lower portions of the stromata in a cluster; at maturity with a rather dull black carbonaceous crust enclosing a spongy flesh which is white at first, blackening with age. Perithecia cylindrical, thinwalled, containing a reddish-brown powdery mass of elliptic-cylindric, pale purplish-brown, spores, 9.5–11 \times 4.5–5.5 μ . Asci not seen but Patouillard claims to have found them. The species was regarded as stylosporous by Montagne.

On bark.

Collections seen :

Cuba : Authentic material ex Herb. Montagne ; *Wright* 315 ; also a collection marked " Nov. Gen. Dr. G. Kunze, Cuba 1822 ".

Mexico : *C. R. Orcutt* 3335, unlocalised.

Nicaragua : leg. *C. Wright*, unlocalised.

Venezuela : Rancho Grande, Maracay, 19.11.1949, *R. W. G. Dennis*, a somewhat dispersed state, approaching a very small *P. poculiformis*.

According to Theissen *Rosellinia caespitosa* Starb. (= *Camillea caespitosa* (Starb.) Theissen) is this species. Material of *Henningsinia caespitosa* Peck, from Cuba, cannot now be found in the Peck herbarium at Albany but the description reads like that of *P. sagraeana*. Peck saw asci 35–40 \times 14–16 μ .

✓ ***Phylacia surinamensis*** (Berk. & Curt.) *Dennis* comb. nov.

Camillea surinamensis Berk. & Curt. in J. Acad. Nat. Sci. Philadelphia N.S. **2**, 285 (1853).

Differs from *P. sagraeana* in its cylindrical rather than pyriform stromata with flat or slightly concave tops and possibly in its slightly larger spores, 12–13 \times 6–7 μ .

Collections seen :

Surinam : on dead bark, Ex Herb. Schweinitz in Herb. Berkeley (Typus).

Guatemala : on dead Ceiba, Uaxactum, *H. H. Bartlett* 12443, 2.4.1931. Panama Canal Zone : Barro Colorado Island, 22.8.1952, *G. W. Martin* & *A. L. Welden* 8657.

Phylacia bomba (Mont.) *Pat. apud Duss* Crypt. des Antilles, Champignons, 74 (1903).

Hypoxylon bomba Mont. apud Ramon de la Sagra, Flora Cubana **1**, 208 (1853).

Camillea bomba (Mont.) Lloyd in Mycological Notes 5, Large Pyrenomycetes 8 (1917).

Stromata erumpent in clusters from blackened patches of subcortical mycelium, hemispherical, about 4 mm. across, with smooth, black, carbonaceous crust and compact purplish-brown flesh. In the upper half of the stroma is a large cavity communicating with the exterior by a large rounded hole in the crust. It is assumed that this cavity is formed by the break-down of a layer of cylindrical perithecia, though Montagne saw no trace of them. It is also assumed that the apical hole is formed by exfoliation, though Ramon de la Sagra, commenting on Montagne's diagnosis enquired " ? Serian tal vez estos taladros debidos a los insectos." Spores 10 \times 5 μ according to Montagne, 13 \times 7 μ in the type collection according to Patouillard who found them 10 \times 5 μ in material from Guadeloupe and thought he saw vestiges of asci.

Collection seen :

Cuba : Authentic material from Montagne.

Thamnomycetes Ehrenberg. *Horae physicae berolinenses* p. 79, 1820, ex Fries in *Linnaea* 5, p. 534, 1830.

The genus *Thamnomycetes* was proposed primarily to accommodate a very distinctive fungus in which perithecia are embedded singly in the tips of branches of an erect, black, dendroid, longstalked stroma. Unfortunately, Ehrenberg also referred to his new genus *Sphaeria hippotrichoides* Sow., which is a good *Xylaria* with superficial perithecia dispersed singly along a wiry axis. He thus introduced an element of confusion which persisted until the rhizomorphic species of *Xylaria* were clearly excluded from *Thamnomycetes* by Lloyd in 1917.



FIG. 15. The known distribution of the three species of dendroid *Thamnomycetes*.

In the true species of *Thamnomycetes* the asci break down within the perithecium, liberating a mass of spores which is extruded from the ostiole, whereas in *Xylaria* the asci are persistent and eject the spores into the air for dispersal by air currents. Presumably in *Thamnomycetes* the method of spore dispersal is somewhat similar to that in *Melanospora* but the only observations on the matter of which I am aware are those of Möller (1901, p. 269), who reported that in *T. chamissonis*, "Sind die Perithezien reif, so treten die Sporen aus der Spitze in Form eines feinen aufrecht stehenden Stäbchens, welches mit einer Nadel leicht abgehoben werden kann. In Wasser lösen sich die einzelnen Sporen leicht von einander." In herbarium material the perithecia are commonly found to be empty and crowned by a thick black cap of extruded spores. I have not seen asci and it is not known if they have the apical, annular, amyloid, thickening characteristic of those of *Xylaria*. It may be because the spores are unfit for air-borne dispersal that the three dendroid species of *Thamnomycetes* have very limited areas of distribution, see map, Fig. 15.

There are, however, in tropical America a few species with rostrate superficial perithecia of the *Thamnomycetes* type dispersed singly along an axis and they are conveniently retained in the genus for the present, in the subgenus *Scopimycetes* P. Hennings, 1904. The accepted species can then be distinguished as follows :

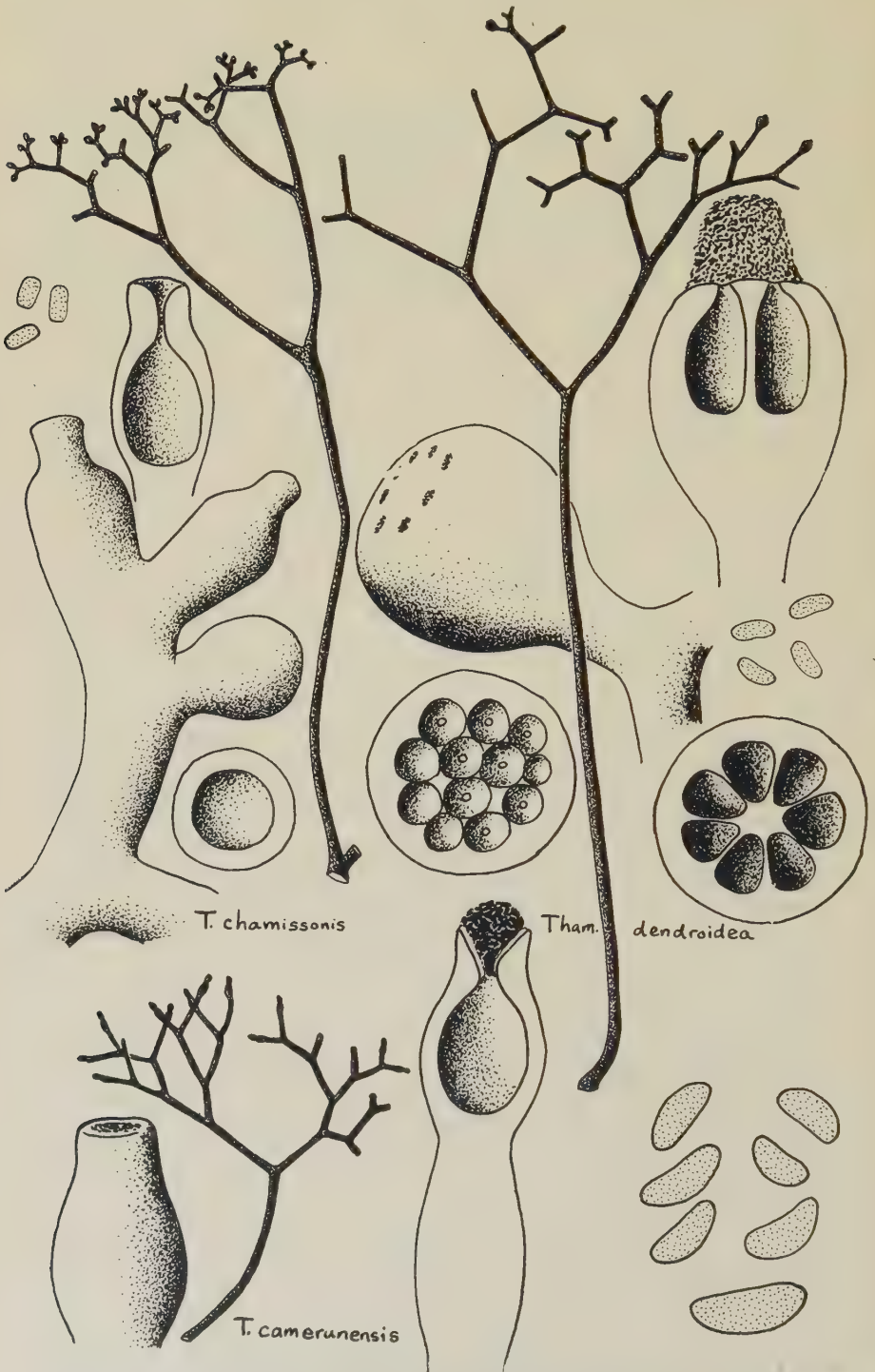


FIG. 16. The three dendroid species of *Thamnomycetes*. Habit sketches natural size, details and sections enlarged, ascospores $\times 660$. In *T. dendroidea* the cross section on the left shows the tips of the perithecia and the ostioles from beneath.

grows on logs. Ule's collection was "Auf abgestorbenen Baumstam" and Möller's on "Sehr hartem trockenen, am Waldboden liegenden Holze."

Thamnomycetes dendroidea Cooke & Massee in Grevillea **16**, 69, March 1888.

Xylaria dendroidea (Cke. & Mass.) Sacc. Syll. Fung. **9**, 537 (1891).

Differs from the preceding in the turbinate tips to the branches, each containing up to 12 immersed perithecia. The collections seen are all from the northern part of South America viz :

Brasil : Para, Caripi, leg. *Spruce*, 1849.

Dutch Guiana : on fallen log, montane forest, Camp No. 2, Saramacca River, 19.7.1944, *Bassett Maguire* 24145F.

British Guiana : on decayed wood in forest, Upper Demerara River, Sept. 1887, *Jenman* 4004, typus.

Venezuela : sur les branches de l'"Uña de Gabilan" bois de la Cruz Ruviera, Guarico, 24.12.1924, *M. Grisol* 31, herb. Paris.

Thamnomycetes rostratus Mont. in Ann. Sci. Nat. Bot. Ser. 2, **13**, 339 (1840).

Xylaria rostrata (Mont.) Sacc. Syll. Fung. **1**, 344 (1882).

Thamnomycetes rostratus Mont. var. *tenuior* P. Henn. in Hedwigia **43**, 263 (1904).

Stromatic axis erect, cylindrical, simple or rarely forked, smooth, black, about 1 mm. thick, hollow, with a carbonaceous crust and black flesh, perithecia scattered individually along the axis, superficial, venter subglobose to flask-shaped, with a long, slender, cylindrical neck. Asci not seen, ascospores elliptic-cylindric or slightly reniform, olive-brown, $8-9 \times 3-4\mu$. Fig. 17B.

Collections seen :

French Guiana : authentic material of *T. rostratus* from Montagne in Herb. Cooke and Herb. Berkeley.

British Guiana : Isorooroo Hills, Aruka River, Oct. 1905, *A. W. Bartlett* 8167.

Brasil : Amazonas, Jurua et Manaus, ad lignum emortuum, 1900 et 1901, Ule, Appendix Mycotheca brasiliensis 29 ; Jurua, 1901, *Ule* 2857, axis unusually thick, almost 2 mm. diam., spores $9-10 \times 4-4.5\mu$, approaching *T. fuciformis*.

Hennings evidently regarded this stout form as typical and proposed his var. *tenuior* for the true type of Montagne.

Thamnomycetes chordalis Fr. in Linnaea **5**, 534 (1830).

Xylaria chordalis (Fr.) Sacc. Syll. Fung. **1**, 345 (1882).

Thamnomycetes rostratus Mont. var. *similis* Berk. in Hooker's Journ. Bot. **8**, 280 (1856).

Comparison of authentic material shows that *Thamnomycetes chordalis* differs from *T. rostratus* in having a purplish-brown film over its black

crust, in its rather more distant perithecia and in their shorter necks. Only two fairly mature perithecia remain on Richard's collection of the former in the Fries herbarium and one obviously would not be justified in destroying these to search for ascospores. None could be found in the open scars from which perithecia had already been broken off and lost. In authentic material of *T. rostratus* the perithecia can be seen to arise as hemispherical protuberances like those of *T. chordalis*, on which the long neck develops later. It seems likely that *T. chordalis* was based on immature material of the same fungus as *T. rostratus* but it is impossible at present to be certain of this. Fries stated that *T. chordalis* had "sporidiis globosis" and if that was correct the two species cannot be the same.

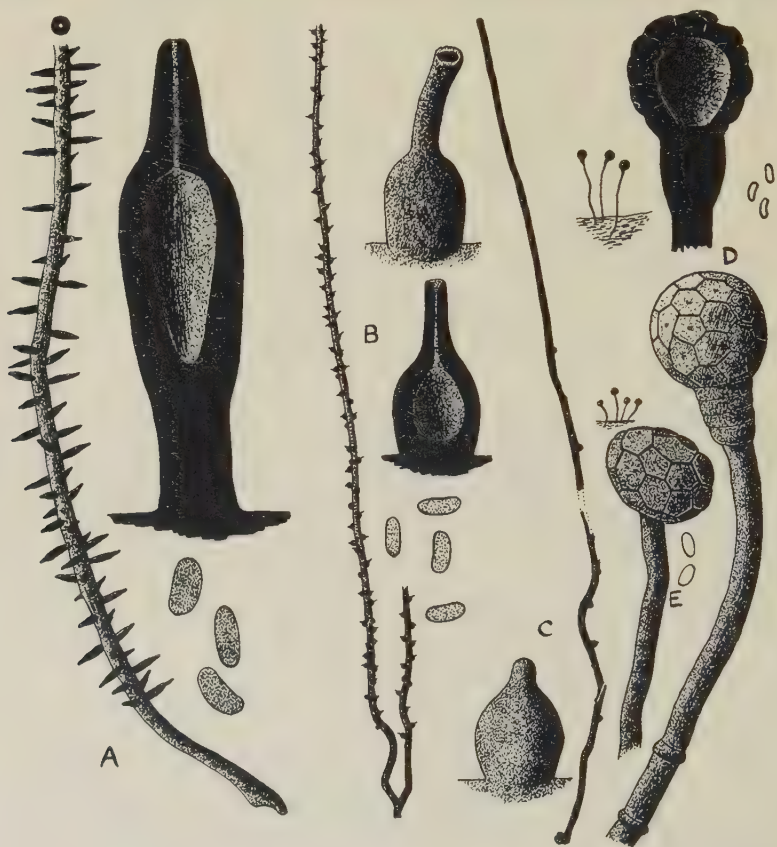


FIG. 17. The species of *Thamnomycetes* with unbranched stromata. A. *T. fuciformis*; B. *T. rostratus*; C. *T. chordalis*, the type specimen in Herb. Fries.; D. *T. annulipes* from the type collection of *Xylaria vermicularis*; E. *Xylaria marasmoides*, from Trail 43, details $\times 15$, ascospores $\times 660$.

Hence I prefer to use the unambiguous name *T. rostratus* for fertile collections with ascospores $8-9 \times 3-4\mu$. The type collection of *T. rostratus* var. *similis* is obviously the same fungus as *T. chordalis*; it is sterile and immature. The collections on which these two names were based are:

French Guiana: leg. Richard, in Herb. Fries, type material of *T. chordalis*. Fig. 17C.

Brasil: Amazonas, Panure, Spruce 163, typus of *T. rostratus* var. *similis*.

Lloyd thought *T. annulatus* Ehrenb. was probably the same as *T. chordalis*.

Thamnomycetes chordalis Fries is apparently not a recombination of *Rhizomorpha chordalis* Acharius, 1814, though there is in Fries' herbarium a sterile rhizomorph from the West Indies labelled "*Rhizomorpha chordalis* Ach.", to which a later hand has added the word "*Thamnomycetes*".

Lloyd's (1917) statement that "We present in our figure (Fig. 851) both Montagne's and Fries' type" is misleading. The right hand photograph of his Fig. 851 was apparently made from a Guiana specimen labelled *T. rostratus* in Cooke's herbarium at Kew. The specimen illustrated in the left hand photograph is not at Kew; it may be in Montagne's herbarium at Paris but it bears no resemblance to the type of *T. chordalis* at Uppsala, kindly sent me on loan by Prof. Nannfeldt. Nor is it clear what Lloyd meant by stating under *T. chordalis*, "A cotype with the fruit mostly gone is at Kew." Kew possesses no material of *T. chordalis* so named by Fries or collected by Richard.

Thamnomycetes fuciformis Berk. in Hooker's Journ. Bot. **8**, 280 (1856).

Xylaria fuciformis (Berk.) Sacc. Syll. Fung. **1**, 345 (1882).

Differs from the preceding in its stouter axis, larger perithecia on short stalks and larger ascospores $11-12 \times 4.5-5.5\mu$. Fig. 17A.

Brasil: in truncis putridis, Panuré, Feb. 1853, *Spruce* 150, typus.

An anomalous little fungus often referred to *Thamnomycetes* is:

Thamnomycetes annulipes Mont. in Ann. Sci. Nat. Bot. Ser. 2, **2**, 75 (1834).

Xylaria annulipes (Mont.) Sacc. Syll. fung. **1**, 345 (1882).

Xylaria marasmoides Berk. & Cooke in J. Linn. Soc. Bot. **15**, 397 (1876).

Xylaria vermicularis Sacc. in Bull. de l'Herb. Boissier Ser. 2, **1**, 80 (1901).

Stroma globose, up to 1 mm. diameter, on a long, slender, unbranched cylindrical stalk up to 12 mm. tall and about 0.2 mm. thick. Crust of the stroma smooth, black carbonaceous, cracked into small hexagonal or pentagonal areas, each with a central dot, perhaps a rudimentary pore, enclosing a single cavity containing loose, very pale smoky-brown, slightly reniform spores $3-4.5 \times 1-1.5\mu$. The stalk is smooth and black, with narrow annular thickenings at intervals and solid black flesh. Fig. 17D. In the specimens examined there are no indications of partitions in the cavity of the head, which is somewhat reminiscent of the cleistocarps of *Cephalotheca* and *Fragosphaeria*. Nor have I seen asci but Saccardo described them in *Xylaria vermicularis* as "perexigua, ovato-oblongis, subsessilibus, $6-8.5 \times 4-4.5\mu$, paraphysibus (ut videtur) nullis; sporidia quaternis, raro subseriis, oblique monostichis". The type collection of *X. marasmoides* has no annular thickenings on the stalks and yields slightly larger spores, $5-5.5 \times 2.25-2.5\mu$ and may possibly represent a distinct taxon. Fig. 17E.

Brasil: Corcovado, Rio de Janeiro, leg. Gaudichaud 1831-33, typus of *X. annulipes* in herb. Paris; I. de Sta. Catharina, ad truncos emortuos,

Ule 495, typus of *X. vermicularis* in Herb. Saccardo ; Capana, on bark, 3.10.1874, typus of *X. marasmoides*, Trail 43.

The type collection of *X. annulipes* has been annotated in ink "id est *Phylacia* ! sec. cl. Patouillard Apr. '08". If the hexagonal plates of the crust indicate the former presence of numerous perithecia this may well be a correct assessment but it is hard to see how such perithecial walls could be fitted into the globose cavity of the head. In species of *Phylacia* the perithecia are arranged in a single horizontal row. If Saccardo has correctly described the asci the species can scarcely belong to the Xylariaceae but it would be desirable to study fresh material in which these essential organs are preserved before pronouncing on the true systematic position of the species.

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TWO NEW BRITISH HYBRID PONDWEEDS.

By J. E. DANDY and G. TAYLOR

Potamogeton × **cadburyae** Dandy & Taylor, sp. hybr. nov. (*P. crispus* × *lucens*). Planta foliis margine serrulatis inter *P. crispum* L. et *P. lucentem* L. media; a *P. crispo* facile distinguenda foliorum forma anguste elliptico-oblonga basi angustata, stipulis elongatis; a *P. lucenti* foliis sessilibus apice rotundato-obtusis, nervis primariis tantum 5-7, obvie distincta.

WARWICKSHIRE (v.c. 38): Seeswood Pool, Nuncaton, with the parent species; without fl. or fr., 2 Aug. 1948, *Dorothy A. Cadbury* (holotype in Brit. Mus. Herb.; paratype in Kew Herb.).

Potamogeton × **pseudofriesii** Dandy & Taylor, sp. hybr. nov. (*P. acutifolius* × *friesii*). Planta inter *P. acutifolium* Link et *P. friesii* Rupr. media; primo aspectu *P. friesii* revocans sed differt lineis sclerenchymatosis nerviformibus inter nervos foliorum primarios interjectis; a *P. acutifolio* stipulis tubulosis, lineis sclerenchymatosis multo paucioribus, distincta.

EAST NORFOLK (v.c. 27): ditch near Buckenham Ferry, Strumpshaw, with the parent species; without fl. or fr., 27 Aug. 1952, *Dorothy A. Cadbury* (holotype in Brit. Mus. Herb.; paratype in Kew Herb.).

NOTES FROM THE EAST AFRICAN HERBARIUM: V.*

BERNARD VERDCOURT

ALISMATACEAE

Wisneria filifolia Hook. f. in Benth. & Hook. f., Gen. Pl. 3, 1007 (1883).

In August 1952 Miss R. H. Lowe collected a species of *Wisneria* in the Malagarasi Swamps. There was no material of the genus in the East African Herbarium and the plant would not key satisfactorily to the mainland species of the genus. At Kew however it was matched with the above Madagascan species. A further sheet at Kew also appears to be the same species but further material is needed to check the determinations.

TANGANYIKA. Malagarasi Swamps, Katare, 11 miles S. of Nguruka, 28 Aug. 1952, R. H. Lowe s.n. (EA, K).

UGANDA. Lake Nabugabo, 1125 m., March 1935, Hancock 7A (K): trails out in water 1 m. deep, in pools among *Limnophyton* and *Miscanthidium* a little way from open water and 45 m. from dry land, flowers white.

BORAGINACEAE

Cordia suckertii Chiov. in Atti della Soc. Nat. Mat. Modena 66, 13 (1934) var. **exasperata** Verdcourt, var. nov. ab planta typica, floribus majoribus, foliis utrinque pilis rigidis scabridis, sparse obtectis, non dense hirsutis, valde differt.

Frutex ramosus usque 3 m. altus. *Rami* crassi, juventute dense scabride pubescentes, demum postea glabri, cortice griseo-brunneo, reticulato, lenticellato, obtecti; ramuli foliacei breves vel elongati, internodiis 0.3-5 cm. longis. *Folia* elliptica vel oblonga, apice rotundata vel emarginata, basi rotundata, cuneata vel truncata, margine integra vel leviter undulata, 2-5.7 cm. longa et 0.7-2.9 cm. lata, utrinque pilis, rigidis, mediofixis, basi incrassatis, scabride obtecta, nervis lateralibus utroque costae 5-7 adscendentibus, utrinque prominentibus, reticulo venorum subprominulo; petiolus brevis, 2-6 mm. longus. *Flores* solitarii, terminales vel axillares, vel ramos laterales, breves, terminanti. *Calyx* spathaceus, tubulosus, 1.4-2.2 cm. longis et 7 mm. latus, intus et extra scabride hispidus, ad unum latus leviter fissus, apice \pm 2-3-lobatus, lobis 3 mm. longis et 4 mm. latis. *Corolla* \pm glabra, coccinea; tubus subcylindricus 2-3.5 cm. longus et apice 1.5 cm. latus; lobi 7, sub-orbiculares, 1.4-1.5 cm. longi et 1.2-1.4 cm. lati. *Stamina* fauce inserta, filamentis brevibus, 3-5 mm. longis; antherae 4 mm. longae. *Stylus* filiformis 3-8 cm. longus, apice bifurcatus, ramis 6-5 mm. longis, stigmatem 1 mm. longo, bilobato. *Calyx in statu fructifero* accrescens, spathaceus coriaceusque. *Fructus* lignosus, globosus, \pm depressus, basi truncatus, apice leviter acutus, 1.6 cm. longus et 1.8 cm. latus.

SOMALIA. Belet Uen, limestone hills, 27 Oct. 1953, Popov 1029 (EA, holotype of var., K, isotype): woody shrub with showy scarlet flowers, "Deen" (vernacular).

ETHIOPIA. Ogaden, near Ferfer, stony hill slopes, 22 Nov. 1953, Popov 1098 (EA, K): erect woody shrub to 3 m., flowers scarlet.

I am indebted to Dr. R. Pichi-Sermolli for loaning a portion of Chiovenda's type of this more or less unknown species. Since the description

*Continued from K.B., 1956, 454 (1957).

is in a rather obscure publication the variety has been described in full. *C. suckertii* is exceedingly distinct and has only one relative in East Africa, namely *C. sebestena* L., which has much larger leaves. It might make a useful ornamental shrub for gardens in semidesert conditions.

COMPOSITAE

Vernonia rhodanthoidea Muschler in Engl., Bot. Jahrb. **46**, 77–8 (1911) var. **densifolia** Verdcourt var. nov. a typo foliis dense confertis, internodiis 2–11 mm. longis (non 5–25 mm.) differt.

TANGANYIKA. Rufiji District : Mafia Island, Kilindoni, *Philippia mafiensis* bush on white sandy soil, 48 m., 14 Sept. 1937, *Greenway* 5256 (EA, holotype of var., K, isotype) : a purple-flowered annual herb up to 0.3 m. tall ; and Mafia Island, bush on sand, 9 Aug. 1932, *Schlieben* 2652 (BM) : flowers lilac.

During an extensive survey of Mafia Island, Dr. Greenway obtained a number of interesting new plants. He had hoped to publish an account including descriptions of these but up to now the MS has not been published. The plant described above can be dealt with since an isotype of *V. rhodanthoidea* (*Busse* 2631) is preserved at EA. It was collected on the Mwera Plateau at Mpunga, 600 m., in 'miombo' woodland. *V. psammophila* Muschler of which an isotype is also preserved at EA, is not more than varietally distinct from *V. rhodanthoidea* and has larger capitula with more glabrescent involucre bracts. Muschler quotes a Braun specimen and gives Amani as the locality. This is quite wrong ; the plant is not a dweller in the rain forest but on sandy soil in dry places !

V. rhodanthoidea Muschler var. **psammophila** (*Muschler*) *Verdcourt* comb. nov.

V. psammophila Muschler in Engl., Bot. Jahrb. **46**, 76 (1911).

TANGANYIKA. Orero to Kilwa Kivindje, sandboden, 4 July 1906, *Braun* 1324 (EA, isotype) : 50 cm. hoch, Blüten violett.

CONVOLVULACEAE

NOTES ON EAST AFRICAN CONVOLVULACEAE (Part I)

These notes contain descriptions of new taxa, new combinations and revisions found necessary during the preparation of an account of the Convolvulaceae for the Flora of Tropical East Africa.

GENERAL REMARKS

The family is a very natural one containing some genera which are very distinct from each other and others which are so similar that they are separated for convenience on technical characters which in other families would be of specific value only. Among the former groups one may mention *Cuscuta*, *Erycibe*, *Prevostea*, and *Humbertia* ; as examples of the latter group *Ipomoea*, *Convolvulus*, *Astrochlaena*, *Merremia*, *Jacquemontia* and *Hewittia*. A reclassification of the family from the study of African genera alone would be unwise and the long-established classification of Hallier f. as followed by van Ooststroom in his valuable series of papers in *Blumea** and in the *Flora Malesiana*** will be followed for the Flora

*The Convolvulaceae of Malaysia, *Blumea* **3–7** (1938–1952).

Flora Malesiana, Series 1, **4 (4) (1953).

of Tropical East Africa with certain modifications. Dr. Meeuse began an investigation of the South African species at about the same time as mine and I have tried to reach agreement with him on as many points as possible.

It must be admitted that many of the characters used to divide the family are single ones poorly correlated with other characters, e.g. stigma shape and pollen ornamentation. A *Merremia* seems to be only an *Ipomoea* with smooth pollen but the former genus does seem to have a facies about it which is recognisable possibly, however, only due to the fact that a botanist cognisant with many species can condition himself into delusions. It is not easy to see how the two genera could be combined and redivided since when other characters are tried the results have been even more artificial.

Cuscuta has been separated off as a separate family. It is certainly distinctive with its scales and parasitic habit but the capsule and sepals are entirely typical of the normal Convolvulaceae and I feel it should not be separated. *Nolana* on the other hand is from its facies a member of the Solanaceae despite the technical difficulties concerning the number of ovules (vide I. M. Johnston's* paper on the Nolanaceae).

Recently G. Roberty (1952)** has published a "Genera Convolvulacearum" which purports to be a classification of the family. His ideas are however (as usual) so completely at a discord with those of all other taxonomists that one is tempted completely to ignore his paper. Some comments are however necessary. He uses a set system for dividing all groups instead of judging each on its merits and realising that different characters have different values in different circumstances. His classification is idealistic, i.e. he divides a group by one character and then assumes that all plants which have that character negative are related to each other and deserve to go into a group of equal designation. Such logical preformed systems do not work in taxonomy because the relationships between groups are complex. These ideas have led Roberty to sink and erect genera to fit in with his scheme and his genera just have not got a sum total of many small distinguishing characters which contribute to the "look of distinctness". It is no use expecting species and genera to obey one set of rules which will apply to all groups. In many groups the differences between genera are less than the differences between species in another and even in one genus some species are infinitely more distinct than others. However unscientific it may sound, species and genera are still those groups which a trained taxonomist feels instinctively should be designated species and genera and not groups erected because they fulfil some set rules. It should eventually be possible to analyse the methods which are used but they are infinitely more complex than the simple rules used by Roberty. One difficulty is that at present many important characters are not measured but merely described by words which convey impressions, e.g. habit, indumentum, texture, and other even more indefinable nuances and it is often just these which give a species much of its distinctness. It is very reassuring to find that detailed synthetic work (such as that of Turrill and Marsden Jones on *Centaurea*) shows that in the main there is a considerable solid backing

*Proc. Am. Acad. Art & Sci. 71, 1-87 (1936).

**Candollea 14, 11-65 (1952).

for the taxonomist's distinctions based on judgement. Roberty (loc. cit. p. 11) strongly criticises the classical works such as the Flora of Tropical Africa and the Pflanzenfamilien for the many errors they contain. I agree there are mistakes but large general works (indispensable to the practical botanist) not admitting of a careful study of each species from the plant itself and written with very little material to hand are bound to contain more errors than detailed monographs. He picks one out of the Flora of Tropical Africa concerning *Porana* and is apparently quite unaware of the fact that 40 years ago N. E. Brown erected a new genus *Metaporana* for the African species which does not have accrescent sepals and does have a dehiscent fruit and that Hallier f. also cleared up the problem by referring the species to *Bonamia* which is where they belong. At the time the account in the F.T.A. was written there was insufficient material to decide on the correct course. Dr. Roberty's paper is itself not free from some serious errors. He erects a new genus *Volvulopsis* (p. 28) for *Evolvulus nummularius* L. but this very species is the type species of the genus *Evolvulus*.* His genus thus is an absolute synonym of *Evolvulus*. If he wished to divide this genus it is the rest that he should have renamed. The new combination *Jacquemontia parviflora* (Vahl) Roberty (loc. cit. p. 32) is based on a slip. It is true that *Convolvulus paniculatus* Burm. f. would be a homonym and antedated by *C. paniculatus* L. but Burmann did not describe a *C. paniculatus* but an *Ipomoea paniculata*. Thus the correct name is still *Jacquemontia paniculata* (Burm. f.) Hallier f. Whether *Astrochlaena* be considered a genus or a subgenus it is not permissible to include *Ipomoea abyssinica* Schweinf. in it since it lacks the main characters of the genus. In contra-distinction to his erection of new and flimsy genera he actually sinks together such species as *I. pes-tigridis* L. and *I. amoena* Choisy which are as distinct as any two species in a genus could possibly be. Roberty's system is to have a cut and dried but useless classification instead of letting the ever increasing body of detailed facts about each individual species gradually crystallise into ever better classifications however incomplete they may be at present.

CUSCUTA L.

Yuncker in his well-known and very useful monograph of the genus *Cuscuta*** distinguishes too many species particularly in the section *Eucuscuta* (i.e. *Cuscuta* s.s. in valid nomenclature). Species 152 to 158 in this work are quite likely to prove conspecific. The matter is, however, complicated by the possibility of races as distinct from morphological species owing to the parasitic habit. More work needs to be done on the well-known European species and nothing is known at all about the hosts and ecology of the African species.

C. suaveolens Seringe in Ann. Sci. Phys. Nat. Agric. & Indust. **3**, 519 (1840).

This species does not appear hitherto to have been recorded from East Tropical Africa. It has been reported from Southern Rhodesia.

KENYA. Naivasha, 21 March 1941, *Nattrass* 209 (EA).

*Vide van Ooststroom in Med. Bot. Mus. Rijksuniv. Utrecht no. 14, 19 (1934).

Mem. Torrey Bot. Club **18 (1932).

C. cassytoides [Nees ex] Engelm. in Trans. Acad. Sci. St. Louis **1**, 513 (1859).

Apart from records from Tanganyika and Kenya this species has recently been received from Ethiopia.

ETHIOPIA. 30 km. N. of Jimma, Lemu, 10 July 1955, *J. Stewart* 107-A (EA) : parasite on coffee in forest.

KENYA. Kiambu District : Karura Forest, 1950 m., 8 June 1952, *Verdcourt* 659 (K, EA) : liane forming dense yellow-green masses on forest shrubs, *Englerodaphne* etc., in *Croton*, *Dombeya*, *Brachylaena*, *Strychnos* forest.

C. planiflora Tenore, Fl. Napolit. **3**, 250 (1824-9) var. **abyssinica** (A. Rich.) *Verdcourt* comb. nov.

C. abyssinica A. Rich., Tent. Fl. Abyss. **2**, 78 (1851).

C. planiflora Tenore var. *holstii* Rendle in F.T.A. **4** (2), 203 (1906).

C. abyssinica A. Rich. var. *ghindensis* Yuncker in Mems. Torrey. Bot. Club **18**, 288 (1932).

This variety is very close to *C. epithymum* (L.) Murr. which seems to differ only in its broader and more overlapping calyx lobes.

ETHIOPIA. Ghinda, *Schweinfurth* 428 (B, holotype of var. *ghindensis*†). Tacazze River, *Quartin Dillon* (P, holotype of *C. abyssinica*).

KENYA. Teita Hills, Mwanta, Sept. 1932, *Gardner* 2964 (EA, K). Thika, 30 June 1947, *Bogdan* 839 (EA).

TANGANYIKA. W. Usambaras, Kwa Mschuza, Aug. 1893, *Holst* 9114 (B, holotype of var. *holstii*†, K, isotype).

C. planiflora Tenore var. **madagascariensis** (Yuncker) *Meeuse* in *Bothalia ined.*

C. madagascariensis Yuncker in Mems. Torrey Bot. Club **18**, 276, f. 144 (1932).

KENYA. E. Aberdares, 12 March 1922, *Fries* 2216 (K). Embu District : Thiba River, 1830 m., 4 Nov. 1940, *Copley* in *Bally* 399 (EA).

Both of these varieties are truly indigenous forms parasitising herbs on high ground up to 2000 m. Yuncker (*in litt.* 1949) has examined *Fries* 2216 and *Gardner* 2964 and agrees with their identification although he does not necessarily agree with the reduction of the species.

FALKIA L.f.

F. dichondroides Baker in Fl. Cap. **4** (2), 82 (1904).

F. canescens C. H. Wright in K.B. **1907**, 54 (1907).

Wright's species is identical with the one described earlier by Baker and occurs in Ethiopia, Kenya, Tanganyika and South Africa.

SEDDERA Hochst.

Investigation of the correct names to be applied to the East African species has involved a study of the species described from Somalia and elsewhere. Although the species of this genus are very distinct from the African plants referred to *Bonamia* they are not unlike the Australian ones originally placed in *Breweria*, usually considered a synonym of *Bonamia*.

KEY TO THE EASTERN AFRICAN SPECIES OF SEDDERA

1. Flowers in dense spherical heads . . . *S. glomerata* (Balf. f.) Schwartz
1. Flowers not in spherical heads 2.
2. Sepals very unequal, the outer three large and cordate . . . 3.
2. Sepals subequal 4.
3. Outer sepals large 10×9 mm. *S. bracteata* Verdc.
3. Outer sepals small 5.5×3 mm. *S. simmonsii* Verdc.
4. "Spinescent" subshrubs i.e. branchlets becoming bare and pointed at the tips; leaves under 8 mm. long, silvery-silky
S. somalensis (Vatke) Hallier f.
 (group not studied) *S. intermedia* Hochst. & Steud.
S. spinescens Peter
4. Subshrubs without spinescent branches or if tending to be spinescent then leaves up to $4-11 \times 1-4$ mm., pilose 5.
5. Leaves linear 6.
5. Leaves not linear 8.
6. Flowers axillary, solitary 7.
6. Flowers in terminal sparse racemes . . . *S. virgata* Hochst. & Steud.
7. Calyx lobes 3-4 mm. long, hairs sparse and adpressed
S. bagshawei Rendle
7. Calyx lobes 6-9 mm. long, hairs numerous, subpatent
S. hirsuta [Dammer ex] Hallier f.
8. Peduncles of cymes up to 2 cm. long, flowers pedicellate . . . 9.
8. Flowers sessile or subsessile, pedicels up to 2 mm. long . . . 11.
9. Indumentum dense, closely adpressed, shining, silvery or golden; hairs mostly unidirectional. Sepals 3-4 mm. long. Peduncles + pedicels up to 10 mm. long (note some axillary shoots with minute leaves can be mistaken for peduncles and attain 3 cm.). Corolla 5-10 mm. long *S. hallieri* Engl. & Pilger
9. Indumentum open to dense, less closely adpressed, somewhat woolly, hairs rather crisped, mostly not unidirectional. Sepals 4-6 mm. long. Peduncles + pedicels up to 2 cm. long . . 10.
10. Leaves elliptic to broadly elliptic, up to $2(3) \times 1.5$ cm., matted woolly pubescent. Sepals 4-6 mm. long; corolla 8-9 mm. long
S. humilis Hallier f. var. *humilis*
10. Leaves elliptic, up to $1.2(2) \times 0.7(1.2)$ cm., pilose with semi-adpressed hairs which are not unidirectional and leaf surface is visible below. Sepals 4 mm. long; corolla 7-8 mm. long (peduncle + pedicel about 1.7-2 cm. long) . . . *S. arabica* (Forsk.) Choisy
11. Indumentum consisting of subpatent hairs, leaves not densely velvety or silky but the lamina visible beneath the hairs. Flowers 2-3 in axillary cymes or if solitary then leaves small and linear-oblong 12.
11. Leaves usually densely velvety or silky, elliptic; flowers solitary . 13.
12. Flowers in 2-3-flowered cymes rarely solitary; leaves usually large (2×1.3 cm.) *S. suffruticosa* (Schinz.) Hallier f.

12. Flowers solitary, rarely in small cymes ; leaves smaller (1.4×0.5 cm.) *S. hirsuta* [Dammer ex] Hallier f
13. Leaves broadly elliptic, up to 3×1.5 cm., villous-sericeous with crisped or subpatulous hairs, not silky with adpressed hairs . 14.
13. Leaves often narrowly elliptic or lanceolate, densely covered with adpressed silvery or golden hairs ; leaves $4-27 \times 2-18$ mm. . 15.
14. Leaves softly velvety, cinereous-pubescent, 14×10 mm. ; corolla ± 7 mm. long *S. cinerea* Hutch. & Bruce
14. Leaves villous with subpatulous hairs, up to 3×1.5 cm. ; corolla $8-9$ mm. long
S. humilis var. *erlangeriana* (Engl. & Pilger) Verdcourt
15. Corolla $5-10$ mm. long ; leaves elliptic to lanceolate, $8-22 \times 2-7.5$ mm., acute ; flowers rarely completely sessile, usually at least shortly pedicellate *S. hallieri* Engl. & Pilger
15. Corolla $4-5$ mm. long ; leaves elliptic, oblong or ovate, $4-14 \times 2-6$ mm., usually obtuse or rounded, mucronate (var. *micrantha* and var. *argentea* have the indumentum less adpressed and less shining ; leaves $13-27 \times 6-18$ mm.) ; flowers completely sessile, sepals smaller and narrower than in preceding species
S. latifolia Hochst. & Steud.

NOTES ON SOME OF THE SPECIES

S. glomerata (Balf. f.) O. Schwartz in Mitt. Inst. Allgemeine Bot. Hamburg **10**, 197 (1939).

ARABIA. Hadramaut: Jol, east road between Mukalla and Sai'un, 1200 m., 30 March 1952, Popov 525 (EA) & 40 m. N. of Mukalla, 1350 m., 24 May 1955, Hemming 521 (EA).

SOCOTRA. Howari, stony slopes, 60 m., 23 Jan. 1953, Popov SO/44 (EA). Reigad, limestone hillside, 600 m., 4 March 1953, Popov SO/200 (EA).

This species differs from all others in having a dense spherical inflorescence and although agreeing with *Seddera* in habit, etc., shows affinities with the section of *Convolvulus* with similar inflorescences.

Another Socotran species also collected by Popov *Convolvulus socotranus* Verdcourt (nom. nov.)* is a puzzling plant. It has the habit of a *Seddera* but the style is simple. Its position in *Convolvulus* is scarcely any more suitable since the stigmas are oblong and not linear. The habit is wrong for *Jacquemontia*.

S. bracteata Verdcourt sp. nov. ; a congeneribus sepalis valde inaequalibus exterioribus ovatis, basi cordatis, $8-11.5$ mm. longis et $6.5-10$ mm. latis, interioribus $5-5.5$ mm. longis et $1.5-2.5$ mm. latis, facile distinguenda.

Herba perennis ; caules numerosi, usque 40, erecti, stricti, ramosi, usque 23 cm. alti e radice \pm ramosa usque 6 mm. diametro exeuntes. Rami pubescentes vel hirsuti, pilis albis vel flavis, subpatentibus dense obiecti. Internodia 3-8 mm. longa. Folia oblonga vel elliptica, basi et apice obtusa, apice mucronulata, 7-18 mm. longa et 5-9 mm. lata, pubescentia vel villosa, pilis albis vel flavis, sat longis ornata, petiolo

*See under *Convolvulus*.

brevi, 1–2 mm. longo. *Nervi laterales* 2–4, obscuri. *Flores* numerosi, apicem ramorum versus dispositi, axillares, solitarii, pedicellis 1–2 mm. longis, bracteis minutis, linearibus, 1.5 mm. longis. *Sepala* inaequalia, tria exteriora ovata, basi cordata, apice \pm acuta, venosa, pilis albis vel flavis sublongis obtectis; duo interiora orbicularia vel ovata, apice foliacea, lanceolata. *Corolla* infundibuliformi-campanulata, alba, 4–6 mm. longa et 8 mm. lata; tubus 2 mm. longus et 1 mm. latus, lobi ovati, apice obtusi, 2–2.5 mm. longi et 2.5–3 mm. lati, apice extra \pm pubescentes. *Stamina* 5, filamentis 2–2.5 mm. longis, basi dilatatis; antherae 0.6 mm. longae. *Styli* 2, basi brevissime connati, 2.25–4.5 mm. longi, stigmata, clavata, 0.3 mm. longa. *Ovarium* ovoideum hirsutum, 1 mm. longum. *Capsula* globosa, acuta, \pm 3 mm. lata, apice sericeo-pubescent. *Semina* 4, glabra, 2 mm. longa.

ETHIOPIA. Ogaden: S.W. of El Rago, 6° 33' N., 45° 43' E., very open bush on red sandy soil, 750 m., 4 Nov. 1953, *Ellis* 255 (K): woody herb to 25 cm. tall, soft pale green leaves and small white flowers. Scillave, 6° 05' N., 44° 45' E., open bush country on red sandy soil, 490 m., 9 April 1956, *Simmons* S 126 (EA): common plant with woody root, 2.5 cm. tall, flowers white, and same locality, 11 April 1956, *Simmons* S 146 (EA): herb to 7.5 cm. with white flowers, "Sorfilay" (Somali), "Naila Abaiyay" (Somali).

SOMALIA. Uegit, silty and gravelly plains, 14 Nov. 1953, *Popov* 1075 (EA, holotype, K, isotype): annual (*sic*) herb to 0.3 m. with white flowers.

This species is another peculiar endemic of the Ogaden area. It is so different from *Seddera* that it might almost be thought worthy of a new genus particularly considering the small characters which have previously been thought sufficient for generic distinction in this family. It shows a technical approach to *Hildebrandtia* but the flowers are hermaphrodite. *Seddera* is however a genus in which the inflorescence and flowers show a wide range of structure but the small subshrubby habit is uniformly characteristic.

S. simmonsii *Verdcourt* sp. nov. affinis *S. bracteatae* *Verdcourt*, sepalis inaequalibus, exterioribus ovatis, apice acuminatis, basi cuneatis, 4.5–5.5 mm. longis et 2–3 mm. latis, interioribus 4 mm. longis et 1.5 mm. latis differt.

Herba perennis; caules plures, ramosi; rami pilis argenteis appressis, obtecti. *Internodia* 5.5–12 mm. longa. *Folia* rotundata, oblongo-rotundata vel obovato-rotundata, apice rotundata vel leviter emarginata, mucronulata, basi cuneata vel rotundata, 6–12.5 mm. longa et 3.5–10 mm. lata, pilis argenteis vel albis, appressis velutine oblecta, petiolo brevi, 1 mm. longo. *Nervi laterales* utrinsecus 2–4. *Flores* numerosi, apicem ramorum versus dispositi, axillares, solitarii, pedicellis 1 mm. longis, bracteis minutis, linearibus, 1.2 mm. longis. *Sepala* inaequalia; tria exteriora, ovata, basi cuneata, apice acuminata, 4.5–5.5 mm. longa et 2–3 mm. lata, pilis albis, sublongis oblecta; duo interiora anguste ovata, apice acuminata, usque 4 mm. longa et 1.5 mm. lata, pilosa. *Corolla* infundibuliformi-campanulata, flava, 4.5 mm. longa et \pm 6 mm. lata; tubus 2 mm. longus et 1.5 mm. latus, lobis semirobundatis, apice obtusis vel truncatis, 2 mm. longis et 4.3 mm. latis, extra pilosis. *Stamina* 5, filamentis 2.5 mm. longis, basi dilatatis; antherae 1.2 mm. longae. *Styli* 2, basi brevissime connati, 3.5 mm. longi; stigmata peltato-clavata, 0.75 mm. lata. *Ovarium* ovoideum, dense hirsutum, 1.5 mm. longum. *Capsula* matura ignota, ? \pm 3 mm. diametro.

ETHIOPIA. Ogaden : Scillave, 06° 05' N., 44° 45' E., very open bush on stony gravel, 390 m., 12 April 1956, *Simmons* S 156 (EA, holotype, K, isotype) : common plant to 0.3 m. with small yellow flowers.

S. simmonsii and *S. bracteata* form a pair of species derived from the *S. latifolia* complex.

S. arabica (Forsk.) Choisy in DC., Prod. 9, 441 (1845).

FRENCH SOMALILAND. Dai Forest, 1350 m., 2 Feb. 1954, *Popov* 1316 (EA) : herb 15 cm. tall with white flowers.

S. humilis Hallier f. in Engl., Bot. Jahrb. 18, 89 (1893).

TANGANYIKA. Massailand, *Fischer* 29 (HBG, holotype). Pare District : Lembeni-Same, 750 m., 31 Jan. 1936, *Greenway* 4550 (EA, PRE, K) : a perennial many-stemmed herb up to 0.3 m. tall with very pale pink flowers ; very common with grasses in *Blepharis edulis* stand on a black very stony sandy soil on a hill slope in the more open parts of *Acacia-Commiphora* association ; Kiruru, 750 m., May 1928, *Haarer* 1335 (EA, K).

S. humilis Hallier f. var. **erlangeriana** (Engl. & Pilger) Verdcourt comb. nov.

S. erlangeriana Engl. & Pilger in Engl., Bot. Jahrb. 41, 293 (1908).

The type of *S. erlangeriana* was burnt at Berlin but very fortunately small fragments of the three *Seddera* described from the Erlanger expedition are all preserved at Kew presumably obtained from Berlin when Hutchinson and Bruce were investigating their *S. cinerea*. The type of *S. humilis* is preserved at Hamburg where I studied it by kind permission of Dr. Domke. It merely differs from *S. erlangeriana* in having long pedicels and peduncles even at the apices of the shoots. *S. arabica* is similar but has smaller flowers and a different indumentum and *S. cinerea* has a very different textured indumentum.

S. hirsuta [Dammer ex] Hallier f. in Ann. Ist. Bot. Roma 7, 224 (1898).

The East African material of this species is separable into two rather indistinct varieties one erect and the other prostrate.

var. **hirsuta**

ETHIOPIA (border). Dolo, R. Daua, 19 April 1893, *Riva* 1189 (FI, lecto-type), Boran, R. Daua, Agualedoio, 19 Aug. 1893, *Riva* 465 (FI). (Several other numbers appear on these sheets as is usual with *Riva* specimens ; *Riva* 465 is a poor fruiting specimen which Dammer had referred in MS to a new species of *Convolvulus*).

KENYA. Turkana District : 25 miles S.W. of Lodwar, stony desert with scattered bushes, 540 m., 12 May 1953, *Padwa* 143 (EA, K) : flowers white ; Loragumu, sandy plain, 600 m., 16 April 1954, *Popov* 1486 (EA) : woody much-branched herb to 0.5 m., flowers white ; 1 mile W. of Lokapel, sandy area with *Acacia misera* mixed bush, 16 July 1954, *Hemming* 324 (EA, PRE, K) : small brush-like plant up to 23 cm. tall and 0.5 m. wide ; 13 miles S.W. of Lodwar, sand dunes with *Acacia misera*, 27 July 1954, *Hemming* 344 (EA, PRE, K) : brush-like plant, 0.3 m. tall and 0.6 m. wide. *Mortimer* T 98 (K) from the same area is also this plant.

var. **gracilis** (Chiov.) Verdcourt comb. nov., ab *S. hirsuta* typica habitu procumbente differt.

S. gracilis Chiov., Fl. Somal. 2 : 323 (1932).

SOMALIA. Near Jonti sul Giuba, *Gorini* 201 & Obe, *Senni* 430 (FI, syntypes).

KENYA. Malka Korokoro, by R. Tana, 26 March 1896, *Thomas in Denhardt* 94 (B†) : procumbent herb with white flowers in sandy grassy areas, "boko" (vernacular) (e desc.). Garissa District : Ijara, on sandy soil, 90 m., 13 Jan. 1943, *Bally* 2080 (EA, K) : prostrate herb with white flowers. Kwale District : Samburu to Mackinnon Road, *Acacia-Commiphora* thornbush, 350 m., 31 Aug. 1953, *Drummond* and *Hemsley* 4069 (K) : subshrub with semi-prostrate branches, corolla white.

TANGANYIKA. Lushoto District : Mkomazi, dry *Commiphora-Acacia* thornbush, 460 m., 30 April 1953, *Drummond* and *Hemsley* 2296 (EA, K) : low-growing shrub with branches running along the surface of the ground, height 15 cm., calyx green with long white hairs, corolla white, filaments white, anthers cream, style white, stigma cream ; and same locality, black cotton soil in *Acacia* desert-grass formation, 23 April 1934, *Greenway* 3991 (EA, K, PRE) : a much-branched prostrate shrub with small white flowers, very common.

This variety has more oblong leaves than var. *hirsuta* and the sepals tend to be a little shorter. *Schlechter* 11815 (Komati Port) which has been identified as a variety of *S. suffruticosa* (Schinz) Hallier f. is very similar in habit.

S. latifolia *Hochst. & Steud.* in *Flora* **27**, Beil 8, t. 5 (1844), var. ***micrantha*** (*Pilger*) *Verdcourt* comb. nov.

S. micrantha *Pilger* in *Engl., Bot. Jahrb.* **41**, 293 (1908).

ETHIOPIA. Dagabur, May 1953, *Ashall* 54 (EA) ; Flusstal Moja, *Ellenbeck* 1091 (B, holotype†, K, fragment).

Similar to the typical variety but the plant has a velvety indumentum of less silvery and less adpressed hairs. Leaves elliptic to broadly elliptic, usually larger, 13–27 mm. long and 6–18 mm. wide. Corolla about 5 mm. long.

Seddera hallieri *Engl. & Pilger* in *Engl., Bot. Jahrb.* **41**, 294 (1908).

A fragment of the holotype of this species (*Ellenbeck* 1916) is preserved at Kew and an isotype is also preserved at the BM. I completely misinterpreted this species at first and thought it might be a lanceolate leaved form of *S. arabica*. Study of a loan of many specimens from Florence (through the kindness of Dr. Pichi-Sermolli) showed that this was quite wrong. Unfortunately the Florence specimens were studied in Nairobi away from the types and could only be compared from memory. I am therefore grateful to Mr. Brenan for comparing many specimens I sent to him with the type fragment at Kew.

The indumentum of this fragment is adpressed and dense with only a few raised hairs ; the hairs lie \pm parallel, pointing approximately towards the apex of either the stem or the leaf. There is a single detached flower showing a peduncle 4 mm. long (the original description indicates up to 1 cm.), a pedicel 1.5 mm. long and a pair of subulate bracteoles. The corolla is about 7.5 mm. long.

S. hallieri proves to be commoner than previously supposed and much more variable. The plants may be relatively unbranched or very branched from the base (e.g. *Gorini* 482) ; the indumentum *in sicc.* varies from silvery to golden-brown and the number of raised hairs varies considerably. The leaves are mostly lanceolate or elliptic (8–22 mm. long and 2–6.5 mm. wide in the case of the lanceolate leaves, the narrowest seen being 22×4 ; a typical elliptic leaf is $12\text{--}14 \times 7\text{--}7.5$ mm.). Peduncle and pedicel length vary considerably ; in some the flowers are subsessile, in others the peduncle is 4–10 mm. long. In *Puccioni &*

Stefanini 595 this variation is shown on one plant, the young shoots having shortly pedicellate flowers and the dead shoots peduncles up to 7 mm. long; this variation could be due to the production of flowers at different seasons. In some specimens slender axillary shoots with minute undeveloped leaves give the appearance of peduncles when actually the flowers are subsessile; the shoots are often up to 2–3 cm. long. In *Bally* 7281 the anthers are about double the length of those in the type and the stigmas round instead of horseshoe-shaped. *Colletette* 112 has elliptic leaves and is similar to *Bally* 7281; it also has flowers 9.5 mm. long whereas the usual length is 5–8 mm. Before realising the nature of *S. hallieri* I had drawn up a description of *Colletette* 112 as a new species but I agree with Mr. Brennan that although it differs from typical *S. hallieri* it would be best to consider all the sheets cited below as belonging to one variable species.

ETHIOPIA. 24 miles E. Neghelli, on rocky hillside, 1368 m., 22 Sept. 1953, *Bally* 9305 (EA, K): small erect herb with white flowers and same locality, 23 Sept. 1953, *Bally* 9306 (EA, K): erect herb to 23 cm., all parts with white tomentum, galled. Neghelli, presso il paese lungo i sentieri, 26 Sept. 1939, *Corradi* 2493 (FI). El Dire, al fortino dintorni del Campo base, 14 May 1939, *Corradi* 2585 (FI). In boscaglia tra El Banno–El Dire (Tertale), 14 May 1939, *Corradi* 8657 (FI).

SOMALIA. Sultanato di Obbia, Boscaglia, bassa presso, Ilbehla, 2 May 1924, *Puccioni* & *Stefanini* 595 (FI). Chisimaio, presso El Ualud, fra la duna e il fiume, 1926, *Gorini* 482 (FI) (a very golden-haired and much-branched form with many hairs subpatent). Presso Amar Gegeb, 21 May 1913, *Paoli* 49 (FI).

SOMALILAND PROTECTORATE. Hargeisa, rocky ground, 1155 m., 14 Nov. 1954, *Bally* 10373 (EA, K) (sphalm. 10273 in EA): slender few-branched herb about 15 cm. tall flowers pure white, corolla 6 mm. long slightly crumpled. 2 miles below Bihendula, 31 May 1949, 840 m., *Bally* 7281 (EA, K) (probably this species, corolla 8 mm. long). Buran, 10° 13' N., 48° 47' E., on rocky ground usually sheltered by rocks, 900 m., 30 Sept. 1929, *Colletette* 112 (K, FI, EA): plant about 35 cm. tall, flowers white, "Hajean" (Wasengelah).

Roberty (loc. cit. p. 29) has erected a new genus *Sedderopsis* for species with entire corollae. Unfortunately the type species *S. capensis* has a very lobed corolla; his genus is quite unfounded and the character is useless. Certain specimens of *S. latifolia* Hochst. & Steud. from Socotra (EA) have larger corollae than usual and it is likely that *S. hallieri* is directly derived from *S. latifolia* or vice versa.

A few records are given for species from Southern Africa.

S. schizantha Hallier f. in Bull. Herb. Boiss. **6**, 532 (1898) e desc.

Bonamia schizantha (Hallier f.) Meeuse in Bothalia, *ined.*

The following three sheets are topotypic.

ANGOLA. Mossamedes; Montemor, km. 74 from Mossamedes, thorn scrub, 500 m., 20 May 1937, *Exell* and *Mendonça* 2123 (BM): climber with white flowers; R. Mucungo, in desert, 27 May 1937, *Exell* and *Mendonça* 2260 (BM): undershrub and ditto, 12 June 1937, *Carisso* and *Sousa* 306 (BM).

Dinter 7070 (BM and PRE) from an undecipherable locality seems to be a variety of this species.

S. welwitschii Hallier f. in Engl., Bot. Jahrb. **18**, 88 (1893).

This species is not recorded from S. Africa but a sheet misidentified as *S. suffruticosa* proves to be *S. welwitschii*.

TRANSVAAL. Between Leucus Creek and Barberton, 7 Jan. 1929, *Hutchinson* 2478 (K): flowers pale blue.

CONVOLVULUS L.

C. socotranus *Verdcourt* nom. nov.

C. fastigiatus (Balf. f.) Hallier f. in Engl., Bot. Jahrb. **18**, 97 (1893) non Roxb.

Breweria fastigiata Balf. f. in Proc. Roy. Soc. Edin. **12**, 83 (1883).

The anomalous position of this has already been mentioned under *Seddera*.

SOCOTRA. Hadibo Plain, 15 m., 15 Feb. 1953, *Popov* SO/111 (EA) : woody bush to 0.6 m., flowers white, common and widespread in the coastal plain.

C. siculus L., Sp. Pl. 156 (1753) subsp. **agrestis** ([*Hochst.* ex] *Schweinf.*) *Verdcourt* comb. nov.

C. agrestis ([*Hochst.* ex] *Schweinf.*) Hallier f. in Engl., Bot. Jahrb. **18**, 101 (1893) non [*Mart.* ex] *Choisy*.

Evolvulus agrestis [*Hochst.* ex] *Schweinf.*, Beitr. Fl. Aethiop. 92 (1867).

The eastern African *C. agrestis* differs from *C. siculus* only in its smaller bracts and does not seem specifically distinct. *Schweinfurth's* name is not available in *Convolvulus* at specific rank but it may of course be used as a subspecific name.

C. (§ *Capitatae*) **jefferyi** *Verdcourt* sp. nov., affinis *C. glomerati* foliis obtusioribus et latioribus, inflorescentiis appresse pilosis differt.

Herba perennis, caulibus subscandentibus vel decumbentibus, sparse ramosis, pilis argenteis vel aureo-brunneis (in sicco) appressis obtectis. *Internodia* 1–8 cm. longa. *Folia* oblonga vel elliptica, leviter obovata, apice leviter acuta vel rotundata, basi cuneata vel obscure hastato-truncata, 8–35 mm. longa et 2.5–19 mm. lata, sparse vel dense appresse pilosa; folia juvenilia \pm argentea; nervi laterales praeter basales; petioli 1–4 mm. longi. *Flores* 2–5 in inflorescentias laxae capitatas bracteatas, sericeo-pubescentes, dispositi; bracteae foliaceae, usque 14 mm. longae et 7.5 mm. latae; pedunculi 1–4.5 cm. longi. *Sepala* inaequilongae, pilosa, elliptica, elliptico-obovata vel spatulata, 5–9 mm. longa et 1–4 mm. lata. *Corolla* purpurea vel azurea 8–10 mm. longa, leviter lobata, glabra, apice parte midpetalino excepta. *Stamina* 5, filamentis 2.5–3 mm. longis, complanatis; antherae 2 mm. longae. *Stylus* filiformis, 3–4 mm. longus; stigmata 2, filiformia 3 mm. longa. *Ovarium* oblongo-ovoideum 0.75 mm. altum. *Capsula* ignota.

KENYA. Kilifi District: Mtondia, sandy grassland, 10 June 1950, *Jeffery* 749 (EA, holotype, K, isotype): a prostrate trailing plant with purple flowers, local in patches; Kilifi, near the sea in sandy grassland, 17 Sept. 1945, *Jeffery* 321 (EA, K): prostrate herb with mauve flowers and light green leaves; Malindi, Blue Lagoon, *Ossent* (EA): corolla blue; Malindi, sand dunes behind beach, sea level, 24 June 1956, *Irwin* 271 (EA, K): flowers blue with white centre and stamens.

This distinct species has been named for the late G. W. Jeffery, an enthusiastic collector at the Kenya coast whose excellently prepared specimens (at EA and K) have added much to our knowledge of this little investigated region.

C. sagittatus Thunb. group

This group of species presents many difficulties in East Africa owing to lack of comparison in the past with South African material. Dr. Meeuse

has recently revised the South African Convolvulaceae and I have had the privilege of reading parts of his manuscript which should be published before this present paper. I disagree in some cases with his views.

The plant usually called *C. sagittatus* Thunb. var. *abyssinicus* (Hallier f.) Rendle can not validly be known by that name. Hallier f. who treated the taxon as a subvariety cited *C. penicellatus* A. Rich. as a synonym thus fixing the type. I have examined the type of Richard's species (a Quartin Dillon specimen preserved at Paris) and found that it has long been misinterpreted and is a typical specimen of *C. farinosus* L. The plant with divided leaves which occurs in the Transvaal and Ethiopia, etc., should therefore be known by the name *C. aschersoni* Engl. or some derivative of that specific epithet. As Dr. Meeuse points out all the forms of this complex which occur in Tropical Africa are nearer to *C. ulosepalus* than they are to *C. sagittatus*; I am however treating these two as varieties of one species and this is the main point of disagreement with Dr. Meeuse. There are narrow leaved specimens growing in Kenya which I am unable to distinguish from typical *C. ulosepalus* and I believe that Dr. Meeuse is wrong in referring them to *C. sagittatus* var. *linearifolia* (Hallier f.) Rendle which has larger flowers.

C. sagittatus* Thunb.**, Prod. 35 (1794) var. ***aschersoni (Engl.) Verdcourt, comb. nov.

C. aschersoni Engl., Hochgebirgsflora Trop. Afr. 349 (1891).

C. sagittatus Thunb. var. *abyssinica* (Hallier f.) Rendle in F.T.A. 4 (2), 96 (1905).

C. sagittatus Thunb. var. *parviflorus* Hallier f. subvar. *abyssinica* Hallier f. in Bull. Herb. Boiss. 6, 533 (1898) *nomen illegit.*

[*C. penicellatus sensu auctt. mult. non* A. Rich., Tent. Fl. Abyss. 2, 74 (1851)].

This plant is very different from the type of *C. sagittatus* preserved at Uppsala but the complex is so variable that it is best to consider it a single species with varieties. A few specimens from widely separated localities are cited to illustrate my concept of the variety. Actually some of these are very close to *C. farinosus* differing only in leaf shape.

ERITREA. Acour, 1900 m., 7 March 1892, *Schweinfurth* and *Riva* 1061 (K). Saganeit 2200 m., 21 April 1892, *Schweinfurth* and *Riva* 1739 (K).

ETHIOPIA. Mega, grassland on lava, 2070 m., corolla, pinkish grey, Gillet 14402 (EA, K): stem creeping.

SOUTHERN RHODESIA. Salisbury, 24 Oct. 1940, *Hopkins* 7828 (SRGH, PRE) and ditto, 29 June 1927, *Young* 109 (PRE).

TRANSVAAL. Pietersburg: Blauwberg, cultivated land, 1110 m., 28 April 1954, *Codd* 8732 (PRE, EA, K): prostrate herb with white flowers.

Actually the very lobed-leaved forms occurring in Central Africa are rather different from the Eritrean sheets. The latter have the main lobe entire whereas in the former it is deeply and jaggedly lobed. There are sheets named *C. ulosepalus* in South African herbaria which are exact matches of the *Schweinfurth* and *Riva* specimens—in fact the three taxa discussed in these notes intergrade considerably.

C. sagittatus* Thunb.** var. ***villosus (Hallier f.) Rendle in F.T.A. 4 (2), 96 (1905).

C. sagittatus Thunb. var. *parviflorus* Hallier f. subvar. *villosa* Hallier f. in Bull. Herb. Boiss. 6, 533 (1898).

C. thomsoni Baker in Kew Bull. **1894**, 67 (1894).

This variety is very similar to *C. bussei* Pilger and *C. hallierianus* Schulze-Menz and these may prove to be varieties of *C. sagittatus* when better material becomes available. They differ in their larger flowers and indumentum, etc. Several specimens identified as *C. sagittatus* var. *abyssinica* are referable to this variety. This variety may have to be merged with var. *aschersoni* (Engl.) Verdcourt.

TANGANYIKA. Mbulu District : Mbulumbul, abandoned wheat field, salt pan area, 1530 m., 28 June 1945, *Greenway* 7486 (EA, K) : perennial climbing herb, flowers pink with purple eye. Moshi District : Ol Molog, wheat field on chocolate loam slope, 1770 m., 21 June 1944, *Greenway* 6911 (EA, K) : a very pale mauve with mauve eye flowered herb with a carrot-like tap root and long procumbent stems ; and Sanya River, 1200 m., March 1928, *Haarer* 1191 (EA, K).

***C. sagittatus* Thunb. var. ulosepalus (Hallier f.) Verdcourt comb. nov.**

C. ulosepalus Hallier f. in Engl., Bot. Jahrb. **18**, 103 (1893).

Dr. Meeuse prefers to keep this as a separate species as do most authors and believes that it does not occur in Central and East Africa. Some of the specimens from Kenya he has referred to *C. sagittatus* var. *linearifolia* but that has larger flowers. He claims that the true *ulosepalus* has unequal sepals and pink flowers but many East African plants answer this description. *Verdcourt* 368 for instance agrees well with the specimen in Thunberg's herbarium which Hallier f. annotated as *C. ulosepalus*. Most South African material it is true has more numerous flowered inflorescences but the sepals are similar.

KENYA. Trans Nzoia District : Endebess, 1860 m., 25 March 1955, *Irwin* 151 (EA, K) : twiner, flowers white, edged with pink. Nairobi District : Thika Road, 5 miles from Nairobi, grassland, 1650 m., 28 October 1950, *Verdcourt* 368 (EA, K) : many prostrate stems from woody root, calyx and stems tinged silver and purple, corolla pale pink.

TANGANYIKA. Kasulu District : above Kasulu, 7 April 1945, *Wallace* 1236 (EA, K) : creeper to 0.6 m., flowers white with purple-red centre.

BELGIAN CONGO. Entre Beni et Kasindi, 11 Aug. 1914, *Bequaert* 5254 (EA).

HYALOCYSTIS Hallier f.

This genus is very close to *Merremia* [Dennst. ex] Hallier f. and possibly not more than a section of that genus. The two species seen have, however, a distinct facies about them and the genus has not been reduced. The spinous-dentate leaves, densely long pilose corolla and thin sepals are distinctive as is the capsule. Nevertheless, bearing in mind the fact that *Merremia* already contains some very divergent groups *Hyalocystis* will perhaps best be considered a section when more is known about it. The only capsule examined was indeed 1-seeded with a large seed as Hallier f. described so this may be a constant character.

KEY TO THE SPECIES

Leaves with undulate margins which are spinous-dentate ; outer sepals 8–13 mm. long and 3–4.5 (–6) mm. wide, lanceolate to ovate-lanceolate, serrate, the teeth often long and filiform . . . *H. viscosa* Hallier f.

Leaves distinctly palmately-lobed, margins spinous-dentate ; outer sepals scarious 12–15 mm. long and 11–13 mm. wide, ovate, entire or \pm toothed . . . *H. popovii* Verdcourt

H. viscosa Hallier f. in Ann. Ist. Bot. Roma **7**, 227 (1898) ; Rendle in F.T.A., **4** (2), 115 (1905).

SOMALILAND PROTECTORATE. Senag Plains, on rocky ground, 29 May 1949, *Bally* 7231 (EA, K) : locally common, flowers rose to salmon with darker centre.

SOMALIA. Merchan, July-Aug. 1891, *Robecchi-Bricchetti* 339 (FI, holotype) : "Baradagis or Baragis" (vernacular). Afgoi to Uanle Uen, 15 April 1939, *Corradi* 8655 (FI).

ETHIOPIA. Haud, 24 miles N. of Duyerali, red sandy soil, grassland with scattered bushes, 8 Feb. 1954, *Bally* 9629 (EA, K) : small spreading herb, flowers yellow with a maroon centre. Dagabur, May 1953, *Ashall* 46 (EA).

H. popovii Verdcourt sp. nov. *H. viscosae* Hallier f. valde affinis, sepalis exterioribus majoribus plerumque integris, foliis lobatis differt.

Herba perennis (vel annua fide Popov), caulibus longis, prostratis, brunneis, leviter striatis, pilis brevibus, glandulosis obtectis. *Internodia* 1-6 cm. longa. *Folia* ambitu suborbicularia vel ovato-oblonga, usque 4 cm. longa et 3-4 cm. lata, leviter palmati - vel palmato-pinnati-7-lobata, lobis \pm 7 mm. longis, margine grosse spinoso-dentata, utrinque pilis brevibus glandulosis obtectis ; petiolus 0.5-2 cm. longus, pubescens ; nervi laterales \pm 7, pinnati vel palmati, praeter basales, supra plana vel leviter impressa, subtus leviter prominentes. *Flores* 2-3 in cymas laxas, numerosas, axillares dispositi, pedunculo pubescenti, 1 cm. longo, pedicellis 2-4 mm. longis, bracteis lanceolatis vel oblanceolatis, scariosis, usque 1 cm. longis et 3 mm. latis. *Sepala* scariosa, membranacea, brunnea vel viridia, venosa, sparse pubescentia ; 3 exteriora ovata vel orbicularia, obtusa, 12-15 mm. longa et 11-13 mm. lata, integra vel plerumque serrata ; 2 interiora, angustiora, usque 12 mm. longa et 3 mm. lata. *Corolla* rubescenti-alba, campanulato-infundibuliformis, 2.5-3.5 cm. longa et 2.5 cm. lata, extra pilis longis, mollis, dense obecta. *Stamina* 5, filamentis 1 cm. longis, basi dilatatis et setoso-pilosis ; antherae 2.5 mm. longae. *Stylus* filiformis, 12-13 mm. longus, basi hirsutus, stigmatibus globosis, leviter bilobatis. *Ovarium* ovoideum, dense pilosum. *Capsula* ignota.

ETHIOPIA. Ogaden : near Wardere, on sandy plain, 1 Dec. 1953, *Popov* 1122 (EA, holotype, K, isotype) : common prostrate annual (sic) herb, flowers pinkish white ; El Rago 6° 33' N., 45° 43' E., Nov. 1953, *Simmons* 56 (EA) and ditto, *Simmons* 24 (EA) and ditto in medium bush 750 m., 10 Nov. 1953, *Ellis* 190 (K) : trailing stems up to 0.6 m., flowers deep cream with salmon pink or deep red centres, flowers open in morning only ; Wardere, 06° 59' N., 45° 20' E., open dry bush country on red sandy soil, 600 m., *Simmons* S 3 (EA, K) : "Baragis" (Somali).

This plant is yet another Ogaden endemic. Several of these endemics have not yet been placed in a family which gives some idea of their exceptional nature. *Peck* 381 (EA) is also this species. It is said to be from British Somaliland but no data are given.

EUPHORBIACEAE

Tetraorchidium ulugurense Verdcourt spec. nov. affinis *T. tenuifolius* (Pax et K. Hoffm.) Pax et K. Hoffm., ramulis glabris, foliis margine integris, eglandulosis, differt.

Frutex glaber vel subglaber. *Rami* juniores, virides, glabri vel pilis minutis perpaucis ornati, demum cortice brunneo, ruguloso, obtecti. *Internodia* 0.7-12 cm. longa. *Folia* membranacea mox chartacea, superne opposita vel ternata, inferne alternata ; elliptica vel oblanceo-

lata, apice acuta vel acuminata, basi cuneata, 3.5–17 cm. longa et 1.2–7 cm. lata, margine integra vel leviter crenulata; petioli 0.2–2.5 cm. longi. *Nervi laterales* \pm 7, patento-arcuati, utrinque leviter prominentes; veni tertiarii laxae reticulati, leviter prominentes. *Inflorescentiae* axillares vel pseudoterminals, "spicatae", graciles, pubescentes, non ramosae, 1–10 cm. longae. *Flores* dioici, glomerulas sessiles, 5–6-floras, dispositi. *Bractae* late ovatae, pubescentes, 1.1 mm. longae et latae. *Flores* ♀ ignoti. *Flores* ♂: tepala hyalina, ovata, cucullata, apice acuta et inflexa, 1–1.25 mm. longa et 1 mm. lata. *Stamina* 3, filamentis \pm nullis, thecis 4, ovoideo-tetragonis, 0.5 mm. longis. *Ovarii* rudimentum basi complanatum, apice capitatum, obscure 4-lobatum, 0.6 mm. longum, apice 0.25 mm. latum.

TANGANYIKA. Morogoro District: Mtibwa Forest Reserve, Nov. 1953, *Semsei* 1435 (EA, holotype, K, isotype): shrub. Turiani, Nov. 1953, *Semsei* 1424 (EA, K): shrub (a form with small leaves) and same locality, Manyangu, Nov. 1953, *Paulo* 199 (EA, K): flowers white.

On some leaves there are one or two traces of glands near the base on each side. *T. minus* (Prain) Pax et K. Hoffm. is a small herb with toothed leaves; *T. didymostemon* (Baill.) Pax et K. Hoffm. (the only other East African species) has thicker denser inflorescences and leaves of a very different texture. *T. oppositifolium* (Pax) Pax et K. Hoffm. has toothed leaves and pubescent stems. *T. tenuifolium* (Pax et K. Hoffm.) Pax et K. Hoffm. has tomentellous stems and petioles, biglandular leaf bases and dentate leaves.

FICOIDACEAE

THE GENUS TRIBULOCARPUS Sp. Moore IN EAST AFRICA

In a recent paper on Aizoaceae Dr. Adamson* reduces *Tribulocarpus* Sp. Moore to a subgenus of *Tetragonia* and states that it is confined to S.W. Africa. Since 1953, however, the plant has been known from the Ogaden, Ethiopia. The compound spiny fruit and the elongated perianth tube are so distinctive that I consider Sp. Moore was correct in maintaining the species as a distinct genus. The extension of distribution is not unique. Several plants occur both in S.W. Africa and in N.E. Africa or Arabia e.g. the genus *Kissenia*, *Pentas schimperiana* (A. Rich.) Vatke and *Merremia ampelophylla* Hallier f. (= *M. guerichiana* [Engl. ex] Hallier f.).

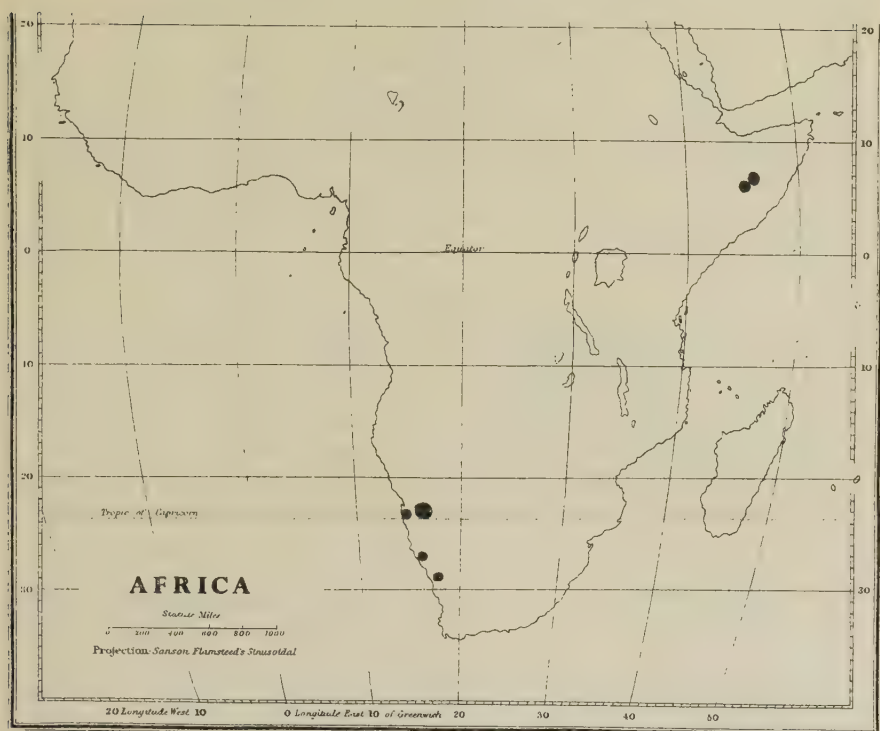
***Tribulocarpus dimorphanthus* (Pax) Sp. Moore** in J. Bot. **59**, 228 (1921).

Tetragonia dimorphanthus Pax in Engl., Bot. Jahrb. **10**, 12 (1889).

Adamson says that the outer flowers in the group are stalked and the inner sessile a statement I do not understand because the ovaries are all congested and the apparent stalks are perianth tubes. In the material I have examined (including S.W. African material) all the flowers have had perianth tubes and none has been purely ♂. Sp. Moore rather hints that some of the material he examined was similar.

ETHIOPIA. Ogaden, El Rago, 6° 39' N., 45° 37' E., Nov. 1953, *Simmons* 78 & *Ashall* 64 (EA); near Scillave, sandy plains, 22 Nov. 1953, *Popov* 1103 (EA, K): herb 0.3 m. tall, flowers white; and Scillave, 06° 05' N., 44° 45' E., open bush on red sandy soil, 336 m., 7 April 1956, *Simmons* S 71 (EA): bush to 0.6 m., flowers white, "Dahooli" (Somali).

*J. South African Bot. **21**, 148–9 (1955).



Map showing the distribution of *Tribulocarpus dimorphanthus* (Pax) Sp. Moore.

Sesuvium sesuvioides (Fenzl) Verdcourt comb. nov.

Diplochonium sesuvioides Fenzl in Monogr. Mollug. (Extra) 292 (adnot.) and Nov. Stirp. Dec. **7**, 58 (1839); Wawra et Peyr., Sert. Bengal, 24 (1860); Sond. in Fl. Cap. **2**, 473 (1862).

Trianthes hyaspica Edgeworth in J. Proc. Linn. Soc., Bot. **6**, 203 (1862).

Diplochonium hochstetteri Stocks in Aitch., Cat. Pl. Punjab, 66 (1869).

Sesuvium digynum [Welw. ex] Oliv., F.T.A. **2**, 586 (1871).

Trianthes polysperma [Hochst. ex] Oliv., F.T.A. **2**, 588 (1871).

Halimus sesuvioides (Fenzl) Kuntze, Rev. Gen. 263 (1891).

Halimum sesuvioides (Fenzl) Hiern var. *reduplicatum* [Welw. ex] Hiern, Cat. Afr. Pl. Welw. **1** (2), 413–414 (1898).

The Index Kewensis refers *D. hochstetteri* to '*Orygia decumbens* Forsk.' but Stock's Scinde specimens preserved at Kew are the present species. C. B. Clarke in Hook., Fl. Brit. India **2**, 661 (1879) states that *D. sesuvioides* is different from *T. hyaspica*, having numerous stamens and shining seeds but the Index Kewensis refers it to *T. hyaspica* and *S. digynum*.

CAPE VERDE ISLANDS. Santa Maria, 2–3 m., 19 Oct. 1934, Dinklage 3192 (K, A): Dünen zwischen Ort und Salzpflanzen, sehr zähliges und fleischiges am Boden Kriechendes Kraut sehr gemein und charakteristisch für den strand.

ERITREA. Massawa, 15 m., 10 March 1954, Popov 1422 (EA): prostrate herb on sandy plains.

SUDAN. Kordofan, Kotschy (K).

KENYA. Turkana : 10 miles N. of Kiangatet, sandy patches on lavastone soils, 5 July 1954, *Hemming* 297 (EA).

TANGANYIKA. Without locality, *Busse* 1071 (EA).

ANGOLA. Mossamedes, Serra do Montes Negros, 10 Aug. 1859, *Welwitsch* 2391 (BM, K).

This plant has been confused with *Sesuvium portulacastrum* L. but the sessile inflorescences are distinctive as also are the rough stems. Hiern discusses several varieties in his treatment of *Welwitsch*'s specimens. I have examined *Welwitsch* 2392, 2394, and 2388 and they are not identical with the present plant.

LEGUMINOSAE

A NEW SPECIES OF *BUSSEA* Harms

Dr. Eggeling and Mr. Semsei have collected a new species of *Bussea* which may be keyed out as follows.

1. Leaflets larger, over 4 cm. long ; apex more or less acuminate but acumen itself often emarginate 2.
1. Leaflets smaller, under 3 cm. long, apex rounded or emarginate 3.
2. Leaflets alternate *B. occidentalis* Hutch.
2. Leaflets opposite *B. gossweileri* Bak. f.
3. Leaflets in 5–10 pairs 4
3. Leaflets in 10–15 pairs, fruit up to 8.3 cm. long and 1.7 cm. wide
B. xylocarpa (Sprague) Sprague et Craib
4. Leaflets in 5–8 pairs, fruit up to 12 cm. long and 1.8 cm. wide with deep median groove *B. massaiensis* (Taub.) Harms
4. Leaflets in 5–10 pairs, fruit up to 15 cm. long and 2.6 cm. wide with concave sides only *B. eggelingii* Verdcourt

B. eggelingii Verdcourt spec. nov. affinis *B. massaiensi* (Taub.) Harms, leguminibus majoribus concavis sed non conspicue sulcatis et *B. xylocarpae* (Sprague) Sprague et Craib similior, foliolis majoribus et paucioribus, fructibus majoribus differt.

Arbor usque 12 m. alta, cortice griseo, ruguloso obtecta. *Rami* brunnei, dense lenticellati, \pm ferrugineo-tomentosi, demum glabrescentes, *Internodia* \pm 6 cm. longa, *Folia* bipinnata, usque 20 cm. longa ; petiolus 3 cm. longus ; internodia inter jugos 1.5–2.5 cm. longa. Pinnae 5-jugae 10 cm. longae ; petioli \pm 1 cm. longi ; rachis ferrugineo-tomentosus. Foliola 6–10-juga, subsessilia, elliptica vel oblongo-elliptica, apice obtusa, minute emarginata, basi oblique cuneata, 1.2–3.2 cm. longa et 0.6–1.3 cm. lata ; glabra vel subtus basi minute puberula, \pm nitida ; nervi laterales 12–14, utrinque prominentes. *Flores* flavi, in paniculas usque 10 cm. longas et latas dispositi ; pedunculi usque 4 cm. longi ; pedicelli 6–7 mm. longi ; rachis dense velutine ferrugineo-tomentosus. *Calycis* *tubus* 3 mm. longus et 4 mm. latus ; lobi intus pubescentes, exteriores ovato-elliptici, acuti, velutino-ferruginei, 6 mm. longi et 4.2 mm. lati ; interiores ovati, apice obtuse acuminati, 8 mm. longi et 5.5 mm. lati, parte medio tomentoso, margine late hyalino, lacerato. *Petala* inaequalia, obovato-orbicularia, apice rotundata, basi angustata, margine lacerata ; lamina glabra, unguiculo ferrugineo-hirsuto ; 4 majora, 21–23 mm. longa et 14.5–17 mm. lata, unguiculo 3 mm. longo et 2 mm.

lato ; unum 14 cm. longum et 9 mm. latum, unguiculo 4 mm. longo et 3 mm. lato. *Stamina* 10, perigyna, filamentis 13 mm. longis, superne glabris, basin versus dense ferrugineo-hirsutis, antheris 3 mm. longis. *Ovarium* dense appresse ferrugineo-pilosum, 5 mm. longum et 1.7 mm. latum, stylo crasso, 6 mm. longo, stigmatе rotundato, peltato, 2 mm. lato, leviter \pm bilobato. *Legumen* immaturum lineari-oblongum, clavatum, apice acutum, basi angustatum, usque 15 cm. longum et 2.6 cm. latum, velutine brunneo-tomentosum, purpureum, lateribus planis vel concavis.

TANGANYIKA. Lindi District : Rondo Plateau, Mchinjiri, March 1952, *Semsei* 723 (EA) : tall straight tree up to 12 m. (same tree as *Eggeling* 6396) "Mnombi" (Kimwera) and ditto, margin of closed forest, 710 m., Nov. 1951, *Eggeling* 6396 (EA, holotype, K, isotype) : tree to 12 m., crown rounded, flowers yellow, the colour of those of *Peltophorum pterocarpum* and with very similar rusty panicles.

I have not seen any material of *Bussea perrieri* Viguier in Not. Syst. **13**, 355 (1949) described from Madagascar ; it is described as having leaflets in 20 pairs, 6 mm. long and 2 mm. wide which will distinguish it from the mainland species.

MALVACEAE

Thespesiopsis mossambicensis *Exell et Hillcoat* in Estudos, Ensaios e documentos **12**, 55 (1954).

While naming G. Pedro's Portuguese East African collection several years ago I annotated the sheets enumerated below as a new species of *Thespesia*. The matter was shelved owing to a long delay in the appearance of field notes for the collection. I am indebted to Mr. Exell for informing me that he has already described the species and considered it worthy of a new genus.

PORTUGUESE EAST AFRICA. Niassa : depois de Metuge, a caminho de Mahate, 3 Sept. 1948, *Pedro* and *Pedrogão* 5026 (EA) : arbusto até 4 m. de altura, flores amarelas mancha das de vermelhosangue ; Entre Metuge e Mahate, 3 Sept. 1948, *Pedro* and *Pedrogão* 5035 (EA, sterile). Mocimba de Praia, entre Diaca e Mueda, 15 Sept. 1948, *Pedro* and *Pedrogão* 5212 (EA) : arvore com cerca de 8 m. de altura. Bilibiza, 6 Sept. 1948, *Pedro* and *Pedrogão* 5064 (EA) : arbusto com cerca de 5 m. de altura, flores amarelas com laivos avermelhados.

MELIANTHACEAE

Bersama abyssinica *Fresen.* subsp. ***paullinioides*** (*Planch.*) *Verdcourt* var. ***ugandensis*** (*Sprague*) *Verdcourt* comb. nov.

B. ugandensis *Sprague* in J. Linn. Soc. Bot., **37**, 512 (1906).

The above combination is needed for the account of this family for the Flora of Tropical East Africa. It was delayed since the taxon seemed more distinct than the other varieties of the species but further study indicates numerous intermediates.

MOLLUGINACEAE

Limeum fruticosum *Verdcourt* sp. nov. ab omnibus speciebus adhuc descriptis habitu frutescente differt.

Frutex lignosus, ramosus, usque 1.8 m. altus ; rami albi, glabri, demum cortice griseo vel griseo-brunneo, leviter fibroso, obtecti ; ramuli brevis-

simi. *Internodia* 0.5–2 cm. longa. *Folia* carnosa, fasciculata, lineari-spathulata, glabra, 4–24 mm. longa et 1–2 mm. lata, apice rotundata, minute mucronulata, basi angusta, petiolo brevissimo. *Flores* albi, 1–3-fasciculati, pedicellis 4.5–6 mm. longis. *Sepala* libera, 5, imbricata, ovata, 4–5.5 mm. longa et 1.5–3 mm. lata, margine hyalino, apice obtusa vel \pm acuta. *Petala* \pm 4, lineari-elliptica vel spathulata, 1.5–2.2 mm. longa et 0.6 mm. lata, basi angustata, 0.2 mm. lata. *Stamina* 7–8, filamentis basi dilatatis, apice filiformibus, partibus inferioribus 1.3–1.7 mm. longis et 0.5–0.8 mm. latis, apice bilobatis, margine filamentis ornatis, superioribus 1 mm. longis; antherae 2 (semper?), 0.5 mm. longae. *Ovarium* biloculare, superum, bicarpellatum, compressum semi-globosum vel semi-annulatum, apice sulcatum, 1.3 mm. altum, 1.7 mm. latum et 1 mm. crassum; ovula solitaria, compressa, erecta. *Stylus* filiformis 2.5 mm. longus, stigmatibus bifido. *Fructus* dicoccus, coccis stramineis, semiglobosis, 5×3 mm., reticulatis.

ETHIOPIA. Ogaden: Wardere, sandy plain, 28 Nov. 1953, *Popov* 1119 (EA, holotype, K, isotype): erect woody shrub 1.8 m. tall, flowers white; between Wardere and Walwal, in *Commiphora* bush, 22 Nov. 1944, *Glover and Gilliland* 305 (EA, K): branching bush 0.9–1.2 m. tall with greenish-white flowers.

The appendages of the fertile stamens are larger than those of the sterile ones. Each coccus is composed of a closed hemisphere extended beyond the plane closing surface as an annulus; the cocci are joined along the circumferences of the annuli. The annular part is smooth externally but the rest of the coccus is reticulate.

The second sheet had been variously placed in the herbarium under first *Lycium* and then *Seddera*. There is however no doubt as to the affinity of the plant but it might perhaps be better placed in a new genus. The fruit is exactly that of *Limeum* despite the anomalous habit. In Schellenberg's key to the genus (Engl., Bot. Jahrb. **50**, suppl. 156 (1914)) it falls into subsection *Glabrae* and comes near to *L. suffruticosum** Schellenb. but differs in the sizes of all its parts. The affinity is however of interest; Schellenberg's species was described from Namaqualand, the flora of which, as has already been mentioned, has some links with that of the Ogaden.

PONTEDERIACEAE

Heterantha callifolia [*Rchb. ex*] *Kunth*. Enum. Pl. **4**, 123 (1843).

TANGANYIKA. Tabora, Ushirombo, Wassergraben, 11 June 1913, *Braun* EAH 5483 (EA): Blüte weiss. Shinyanga, open marshy ground, Jan. 1932, *Bax* 397 (K): flowers purple.

This plant appears to be rare in East Africa but has perhaps been overlooked.

RUBIACEAE

Bertia pauloi *Verdcourt* sp. nov. affinis *B. spicatae* (Gaertn. f.) Wernh., foliis haud utrinque pilosis, alabastris glabris differt.

Arbor parva, ramis brunneis, pilis setosis appressis, dense obtectis. *Internodia* 4–9 cm. longa. *Stipulae* magnae, ovato-lanceolatae, usque

*H. C. Friedrich in his recent revision of this genus (Mitt. Bot. Staatssam. München **14–15**, 133–166 (1956)) reduces this species to *L. aethiopicum* Burm. subsp. *namaense* Friedr. The specimens of the new species were sent to him and he agrees that they represent a distinct form.

18 mm. longae et 8.5 mm. latae, apice acutae, basi subauriculatae, extra, pilis setosis appressis, obtectae, intus glabrae. *Folia* oblongo-elliptica usque 19.5 cm. longa et 6.6 cm. lata, apice acuta, basi cuneata vel leviter subcordata, subsessilia, petiolis canaliculatis, 3–4 mm. longis, utrinque \pm glabra sed margine et nervi, pilis nitidis, appressis, subtus ornata. *Nervi laterales* 9–14, subtus prominentes. *Flores* albi, in cymas 3–6-floras dispositi; cymae subsessiles, in spicas densas 3–4 cm. longas instructae; pedunculi 2–3 cm. longi; internodia \pm 6 mm. longa. *Calyx* dense, appresse, hirsutus; tubus 2.25 mm. longus et 2 mm. latus, limbus 2.25 mm. longus, obscure 5-crenulatus, lobis obtusis, mucronulatis, 0.3 mm. longis et 1 mm. latis. *Discus* annularis, 0.8 mm. diametro et 0.3 mm. altus. *Corolla* extra glabra, ovoideo-urceolata, apice angustata, 5 mm. longa et basi 2 mm. lata, apice 0.6 mm. lata; tubus 1.5 mm. longus, intus fauce, pilis aggregatis ornatus; lobi 5, stricte erecti, apice patentes, valde imbricati et convexi, ovato-lanceolati, apice acuminati, basi rotundati, 3.2 mm. longi et 1.5 mm. lati. *Antherae* subsessiles, oblongae, apice acutae, 2 mm. longae et 0.5 mm. latae. *Stylus* clavatus, complanatus, integer, demum bilobatus, lobis 1.6 mm. longis et 0.4 mm. latis, extra trialatis. *Infructescentiae* usque 9 cm. longae, pedunculo 0.8–6 cm. longo, pedicellis crassis, 2 mm. longis. *Fructus* coriaceus, 6 mm. longus et 5.5 mm. latus, calyce persistente, obscure coronatus; discus conicus, 1–2 mm. latus et altus. *Semina* numerosa, subnitida, brunnea, rugulosa, angulata, \pm 1.2 mm. longa.

TANGANYIKA. Morogoro District: Koruhamba Mountains, Nov., 1953, Paulo 224 (EA, holotype, K, isotype): small tree with white flowers.

***Dasycodon manganjae* (Hiern) Verdcourt comb. nov.**

Gardenia manganjae Hiern in F.T.A. **3**, 103 (1877).

Randia buchananii Oliv. in Hook. Ic. Pl. t. 1356 (1881).

R. fratum K. Krause in Notizbl. Bot. Gart. Berlin **10**, 604 (1929).

The above would appear to be the correct name for this attractive shrub which is widely distributed in Mozambique, Nyasaland, Tanganyika, Kenya and Uganda. The combination is needed for use in forthcoming works by Messrs. Trapnell & Dale.

***Heinsia bussei* Verdcourt sp. nov.** affinis *H. densiflorae* Hiern, foliis valde discoloribus, corollae lobis non longe aristatis, calycis lobis latioribus differt.

Arbor parva usque 9 m. alta (sic), ramosa; rami penduli, pubescentes vel hirsuti, demum glabrescentes, cortice nigrescente, lenticellato obtecti. *Internodia* 1–13 cm. longa. *Stipulae* bilobatae, usque 8 mm. longae, nigrae, parte mediano pallido, lobis lineari-lanceolatis 3–5 mm. longis, fissae. *Folia* oblonga vel ovato-elliptica, apice acuta vel \pm acuminata, basi cuneata vel rotundata; petioli 3–4 mm. longi; lamina valde discolorata, supra viridis, pilis paucis obtectis, subtus grisea, pilis intertextis, velutinis, dense obtectis. *Nervi laterales* 5–7. *Flores* 1–3 in apice ramorum dispositi. *Calycis* tubus campanulatus, 5 mm. longus et 4 mm. latus, dense pilosus; lobi foliacei, inaequales, 4 ovato-elliptici, apice \pm acuti, basi unguiculati, pubescentes, 12–14 mm. longi et 6–7.5 mm. lati, 3–5-nervati, unguiculo 3.5 mm. longo et 2 mm. lato, canaliculato, piloso;

unus 3 mm. longus et 2 mm. latus. *Corolla* alba, hypocrateriformis, appresse pilosa; tubus 2-2.5 cm. longus, basi 2 mm. latus, apice 5 mm. latus, 1.1 cm. infra os barbatus; lobi 5, imbricati, 2.2 cm. longi et 1.2 cm. lati, extra sericeo-pilosi, intus puberuli. *Antherae* 5, 5.5 mm. longae, 0.5 mm. infra os insertae. *Stylus* filiformis, 5.7 mm. longus, apice bilobatus, stigmatibus 6 mm. longis et 0.9 mm. latis. *Fructus* ignotus.

TANGANYIKA. Lindi District: Rondo Plateau, Mchinjiri, 810 m., Jan. 1952, *Semsei* 619 (EA, K). Lindi District, without locality, 1900-1, *Busse* 1083a (EA, holotype, K, isotype).

Dolichometra leucantha K. Schum. in Engl., Bot. Jahrb. **34**, 331 (1904).

This is one of the commonest and most characteristic plants of the lowest herb layer in the East Usambaras rain forest yet it is rare in herbaria. The East African Herbarium contains the following material and since the syntypes (Amani, 15 & 18 Sept. 1902, *Engler* 613 and 722) have been destroyed a neotype has been chosen from the same locality. There are 18 ovules on one placenta and not 4-6 as K. Schumann states.

TANGANYIKA. East Usambaras: Amani, Mt. Bomole, grassy path in rain forest, 930 m., 21 Jan. 1950, *Verdcourt* 55 (EA, holoneotype, K, isoneotype): prostrate perennial creeping herb rooting at the nodes, leaves softly pilose, flowers infundibuliform, pure white, with *Oplismenus* and *Pseudechinolaena*; Sigi River, evergreen rain forest, 900 m., 11 Nov. 1936, *Greenway* 4731 (EA, K): a perennial procumbent mat herb with white flowers locally common on wet ground with *Chlorophytum*, *Dracaena deremensis* in *Cylicomorpha parviflora*, *Alangium*, *Cephalosphaera*, *Sersalisea* forest; Mt. Bomole, Dec. 1921, *Don Carlos* AH 5955 (EA); ditto, 15 March 1921, *Soleman* AH 5956 (EA); Amani, Urwald, *Zimmermann* AH 7816 (EA): Niederliegend, Blätter dunkelgrün, Blüten schneeweiss; Amani, Urwaldrand, *Grote* AH 7817 (EA): Amani, Urwald, *Warnecke* AH 7818 (EA): Niederliegend, Blüten schneeweiss; Amani, 1903, *Busse* 2222 (EA).

This species is I believe strictly endemic to the East Usambaras. The only other locality in which I have seen it is on Mt. Mlinga, the highest point of a small range situated between the sea and the Usambaras and practically forming part of them.

Pentanisia renifolia *Verdcourt* in Bull. Jard. Bot. Brux. **22**, 271 (1952).

It is perhaps worth mentioning that this species is abundant in the Katanga. There are numerous sheets at Brussels which I did not see when monographing the genus owing to the fact that they had been placed in the "indets." at the end of the Rubiaceae. M. Petit showed them to me when I visited Brussels recently.

Neopentania gossweileri *Verdcourt* in Kew Bull. **1953**, 114 (1953) var.

There are specimens of the above species at Brussels kindly shown to me by M. Petit which have wider leaves than the type (up to 23×6 mm.). Since the comparison was made only from memory I hesitate to give them a varietal name. Specimens from intermediate localities may well connect the two.

BELGIAN CONGO: Kwango, Kabasengo, savane herbeuse, 13 Feb. 1952. *Callens* 3314 (BR): plante à fleurs blanche, entre les graminées. Source de R. l'Insia, savane, 8 Feb. 1950, *Callens* 2506 (BR): fleurs blanches. Manzengle, 8 Feb. 1950, *Callens* 2314 (BR): fleurs bleues. Région de Mawanga, savane herbeuse, 30 April 1953, *Callens* 4069 (BR): fleurs blanches.

Pentas micrantha Baker subsp. ***wyliei*** (N. E. Br.) Verdcourt in Bull. Jard. Bot. Brux. **23**, 308 (1953).

I am recording this species for Northern Rhodesia on the evidence of a fruiting specimen only. Flowering material is needed to absolutely confirm the record.

NORTHERN RHODESIA. Mpika, in "mushitu", 31 Jan. 1955, *Fanshawe* 1912 (Forest Herb., Kitwe) : herb to 1.5 m. tall growing in small colonies ; leaves soft, thin ; flowers white.

P. herbacea (Hiern) K. Schum. in Just., Bot. Jahresb. **26**, 392 (1900).

In my monograph of the genus *Pentas* I doubted the record in Andrew's "Flora of the Sudan". The specimen substantiating the record has now been shown to me by Mr. Dandy at the British Museum. Since it was in a box of Wyld specimens named but damaged in the last war and not considered fit to lay away it is hardly surprising that it was originally missed ! There is an error in the monograph—Broun and Massey do not record the species in their earlier Flora. Since no specimens are cited in Andrew's flora the sheet is cited below.

SUDAN. Zandeland, R. Nagari, 7 Oct. 1939, *Wyld* 623 (BM) : shrubby plant in open ground "Atuka" (vernacular).

I have also recently seen two sheets from Northern Rhodesia from which country it has not previously been recorded. The specimens were loaned to me from the Forest Herbarium, Kitwe.

NORTHERN RHODESIA. Ndola, thicket in plateau woodland, 3 March 1954, *Fanshawe* 903 : herb to 0.6 m. with tiny white flowers. Chingola, relic evergreen thicket, 17 April 1954, *Fanshawe* 1091 : herb to 0.9 m. with white flowers.

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Botanical Museum and Herbarium	Copenhagen
Institution för Systematisk Botanik	Uppsala
Herbarium Universtatis Florentinae, Istituto Botanico	Florence
Botanischer Garten und Museum der Universität	Zürich

I have seen the specimens mentioned in this paper except those marked as destroyed (†) or with an asterisk.

NOMENCLATURAL NOTES.*—II.

A. A. BULLOCK

CARDIOPTERIDACEAE

The generic name *Cardiopteris* has been attributed to Robert Brown "in Wall. Cat. No. 8033" and the type of the name is *C. lobata* R. Brown, similarly invalidly published. *Cardiopteris* was first described by Blume in 1847, but the name is antedated by *Peripterygium* Hasskarl, who published in 1843, using the combination *P. quinquelobatum*.

Blume described two species, but the generic name, being derived from the Wallich Catalogue, is dependent upon *Cardiopteris javanica* which is illegitimate because Blume cited Hasskarl's earlier name in synonymy. The synonymy was given by Bennett and R. Brown in 1852, but they also used the illegitimate name *C. lobata* of the Wallich Catalogue.

Blume had, however, reached the taxonomic decision that this genus constituted a distinct monotypic family for which he coined the name *Cardiopterideae*. Under Art. 18 of the Code this must be changed to *Cardiopteridaceae* but the authorship and date of valid publication remains "Blume, 1847".

Masters (1875) regarded the genus as of doubtful affinity and placed it near the *Olacaceae*, where it had been placed in the treatment given by Baillon (1872). Engler (1893) included it in *Icacinaeae* as the monotypic subfamily *Cardiopterygoideae*. It was not until 1905 that Williams reasserted the family status, but he adopted the illegitimate name *Peripterygiaceae* which has been used also by Sleumer (1940, 1942).

Gagnepain (1910) resuscitated the correct family name *Cardiopteridaceae*, when he gave reasons for dividing the *Olacaceae* (*sensu latissimo*) into no fewer than eight families.

The synonymy of the family name and its type genus is as follows :—

Cardiopteridaceae Blume, Rumphia 3 : 205, *adnot.* (1847) ; Gagnepain, Bull. Soc. Bot. France, 57 : 377 (1910).

Peripterygiaceae F. N. Williams, Bull. Herb. Boiss. Sér. 2, 5 : 225 (1905) ; Sleumer, Notizbl. Bot. Gart. Berlin, 15 : 257 (1940), et in Engler et Prantl, Natürl. Pflanzenfam. ed. 2, 20b : 397 (1942).

Icacinaeae subfam. *Cardiopterygoideae* Engler in Engler et Prantl, Natürl. Pflanzenfam. 3 (5) : 257 (1893).

Peripterygium Hassk. in Hoeven et De Vriese, Tijdschr. Nat. Gesch. Phys. 10 : 142 (1843), et Cat. Hort. Bogor. 234 (1844) ; F. N. Williams, *loc. cit.* ; Sleumer, *loc. cit.* ; non *Peripterygia* Loesener, 1906.

Cardiopteris Blume, *loc. cit.* ; Bennett et R. Brown, Pl. Jav. Rar. 246, t. 49 (1852) ; Benth. et Hook. f. Gen. Pl. 1 : 355 (1862) ; Baillon, Adansoniana, 10 : 279 (1872), et in DC. Prodr. 17 : 25 (1873) ; Masters in Hook. f. Fl. Brit. India, 1 : 597 (1875) ; Engler, *loc. cit.* ; Gagnepain, *loc. cit.*

Holotypus nominis generici :—**Peripterygium quinquelobatum** Hassk. (1843).—*Cardiopteris javanica* Blume (1847) ; *C. moluccana* Blume (1847) ; *C. lobata* Wallich ex Bennett et R. Br. (1852) ; *C. rumphii* Baillon (1873).

*Continued from Kew Bull. 1957: 296 (1957).